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ABSTRACT

Employment and professional activities of recent science and engineering graduates who described their work as energy-related were examined. The survey included graduates who received bachelor's or master's degrees between 1972 and 1979 and was conducted in 1976, 1978, 1979, and 1980. Data indicated that the number of graduates who reported working in energy-related activities grew by 70 percent from 33,000 to 56,000 between 1976 and 1980. This growth was concentrated in business and industry, with one-half or more of the engineers citing work activities that were "production-oriented." Nearly one-third of the scientists cited exploration as their major activity. Almost half of the new scientists and engineers cited petroleum or natural gas as the focus of their professional work. In 1979 and 1980, coal-related industries employed one-fifth of the energy-related scientists and engineers. A shift from oil and natural gas toward coal and nuclear power could increase employment in this industry. Opportunities for nuclear engineers should continue to grow as new plants are brought on line. In 1979 and 1980, approximately one-sixth of the graduates devoted their time to solar and renewable energy sources. As federal funding is cut, the graduates might move to other projects. Following the 22-page narrative section, appendixes provide the nature and conduct of the survey discussed in the report and detailed results. Following this are 130 pages of tables. (YLB)

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ED220688

RECENT SCIENCE AND ENGINEERING GRADUATES WORKING IN ENERGY-RELATED ACTIVITIES, 1979 AND 1980

Prepared by

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NOTE

This study focuses primarily on new scientists and engineers who reported, in a national survey of new science and engineering graduates, that they devoted the most significant amount of their professional time to energy- or fuel-related activities. The survey included only graduates who received bachelor's or master's degrees between 1972 and 1979 and was conducted in 1976, 1978, 1979, and 1980 by Westat, Inc., for the National Science Foundation and the U.S. Department of Energy. In this report, the science and engineering graduates indicating that their most significant work was in energy or fuel are usually referred to as *new scientists and engineers working in energy-related activities*. Occasionally, however, they are referred to by the equivalent phrases *energy-related scientists and engineers* or *energy-related new graduates* to save space.

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HIGHLIGHTS

RECENT SCIENCE AND ENGINEERING GRADUATES WORKING IN ENERGY-RELATED ACTIVITIES, 1979 AND 1980

Energy-Related Employment. The number of new bachelor's and master's graduates who reported spending the largest proportion of their professional time on energy-related activities grew by 70 percent between 1976 and 1980: from 33,000 to 56,000. This growth paralleled the steady growth in energy industries and, to a lesser extent, increases in federal funding for energy R&D.

Petroleum and Natural Gas. Nearly half of the new scientists and engineers working in energy-related activities cited petroleum or natural gas as the focus of their professional work. New earth and environmental scientists, whose skills are crucial to petroleum exploration, were hired in increasing numbers in each year of the survey. The market remained strong for other graduates whose skills are used heavily in exploration and drilling activities.

Coal. In 1979 and 1980, coal-related industries employed one-fifth of the energy-related new scientists and engineers. The need for improved mining techniques and cleaner ways to burn coal make it likely that science and engineering employment in this industry will grow. However, the rate of growth may depend on the nation's commitment to coal as a major source of energy. The synthetic fuels industry, which was to use a substantial amount of coal by the end of the decade, may fall far short of the original goals because of cutbacks in federal funding and private industry participation.

Nuclear Energy. Rapid growth in nuclear generating capacity has drawn increasing numbers of engineers (especially nuclear engineers) to the design and operation of nuclear power plants. The completion of plants already under construction and the modification of existing reactors will require additional engineers through the end of the decade. However, the long-term fate of the industry (and thus of nuclear engineering employment) is subject to large uncertainties at the present time.

Renewable Energy Sources. In 1979 and 1980, roughly one-sixth of energy-related new graduates devoted their time to solar and other less conventional energy sources, possibly as a result of substantial federal funding for these activities. This funding is scheduled for sharp cuts in the 1980s, and many graduates may move to other projects unless private support increases dramatically.

Field Mobility. To meet domestic production goals, U.S. energy industries will require large numbers of new graduates in key fields of science and engineering. Survey results for the four years indicate that many new B.S./M.S. graduates will switch employment fields in response to personnel shortages that may arise. In those fields that grew most rapidly in the energy industries (earth/environmental sciences and some engineering fields), positions were often filled by graduates with degrees in related fields (physics, mathematics, and computer sciences). Where positions in high-demand fields are filled by graduates from related fields, however, employers may be faced with increased training costs, lower productivity, or both.

Type of Employment. Growth in the number of energy-related scientists and engineers from 1976 to 1980 was concentrated in business and industry. Other sectors of the economy also employed increased numbers of energy-related graduates during this period, but together they accounted for only one-fifth of the total growth.

Activities. Whether reporting overall work activities or tasks specifically related to energy, one-half or more of the engineers consistently cited production-oriented activities. In addition, nearly one-third of the scientists cited exploration as their major energy-related activity.

INTRODUCTION

During the next decade, domestic energy sources will play an important role in meeting U.S. energy needs, as the 1981 National Energy Policy Plan makes clear. As U.S. energy industries expand to meet this challenge, the demand for trained scientists and engineers will intensify. Yet this energy push comes at the same time as a call for new engineering efforts in the manufacturing sector to develop new processes and improve productivity, and many question whether we will have sufficient technically trained professionals to achieve these goals.[1] Shortages, especially in a few key fields, could hinder the nation's efforts toward energy self-sufficiency and economic growth. Therefore, the rate at which colleges and universities can produce new graduates in these fields and the number of graduates who have been attracted to energy-related pursuits are important to the success of energy policies. This report examines the employment and activities of recent science and engineering graduates who described their work as energy-related and relates some of the changes in their employment experiences to the changing energy situation during the 1970s. The findings presented here are based on the National Science Foundation/U.S. Department of Energy survey of recent bachelor's and master's degree recipients taken in 1979 and 1980. These results are also compared with the results from two earlier years, 1976 and 1978. The nature and conduct of this survey are discussed in Appendix A. The detailed results are presented in Appendixes B, C, D, E, and F.

ENERGY TRENDS AND ENERGY-RELATED EMPLOYMENT

Since 1973, the price of imported oil and natural gas has risen dramatically, and its impact on the demand for energy has been clear. Between 1965 and 1973, energy consumption grew at an annual rate of 4.3 percent, while from 1973 to 1978, it grew much more slowly at 0.9 percent per year. Because of continuing energy price increases and their restraining effect on economic growth, the Energy Information Administration (EIA) predicts a further annual decrease in energy consumption of 0.1 percent from 1980 through 1985 with annual increases of less than 1 percent from 1985 through the end of the century.[2] The 1981 National Energy Policy Plan projects a similarly slow demand growth through the end of the century.[3]

As imported energy prices continue to rise, the nation has begun to shift toward domestic energy sources, a trend that the EIA expects to continue through the 1990s (Figure 1). Yet this increase in domestic production can only be accomplished with an increase in the number of scientists and engineers whose efforts are directed at energy research, development, and production. The survey results reported here indicate that a growing number of new graduates are, indeed, turning their attention to energy problems. In just four years the number of graduates whose work was energy-related grew by a dramatic 70 percent. From 33,000 in 1976 the number rose to nearly 50,000 in 1978, to 52,000 in 1979, and 56,000 in 1980. Since the total number of graduates in these years remained stable, those working in energy-related activities also formed an increasing proportion of new science and engineering graduates (4.6 percent in 1976 and 9.6 percent in 1980).

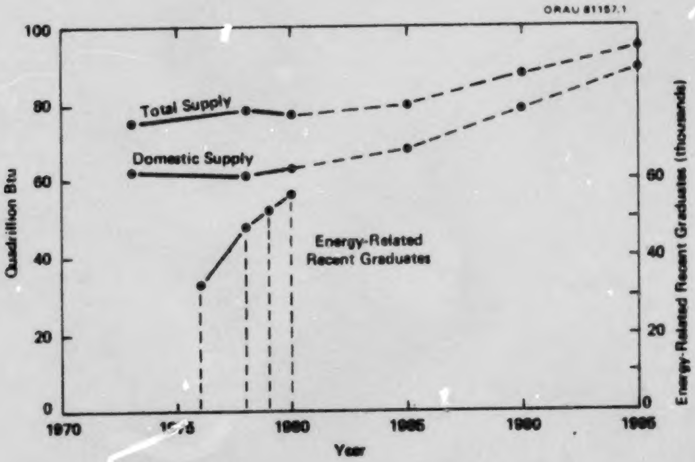


Figure 1. EIA Projections of U.S. Energy Supplies to 1995; New Graduates Working in Energy-Related Activities in 1976, 1978, 1979, and 1980

Source: U.S. Department of Energy, Energy Information Administration, *Annual Report to Congress: 1980 and 1981* (Washingtonn, D.C.: USGPO, 1980, 1982) and U.S. Department of Energy, Office of Energy Research.

This increase in energy-related new graduates coincided somewhat with an increase in federal funding for energy research and development (Figure 2) but even more with industrial research and development efforts and the steady growth

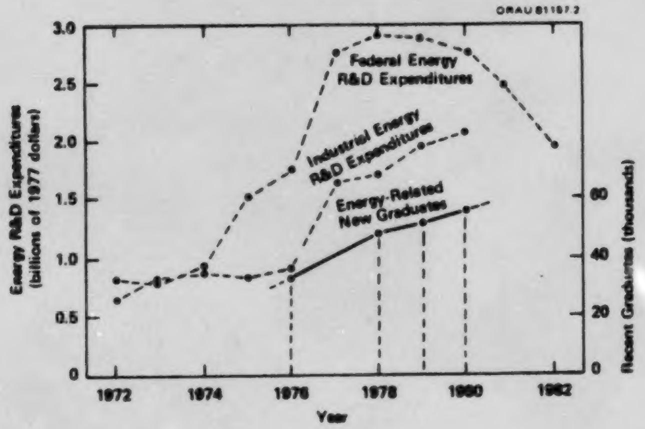
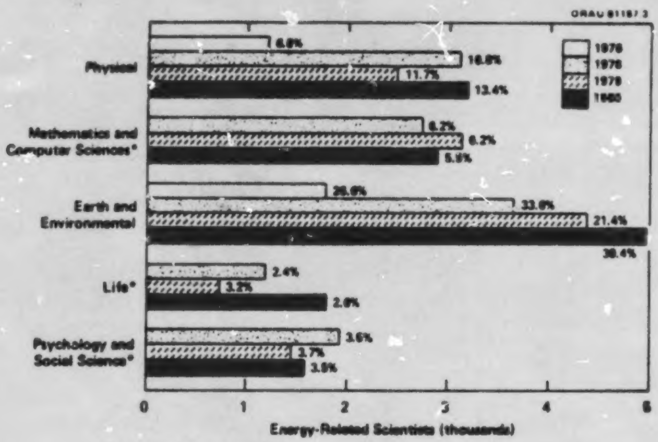


Figure 2. U.S. Government and Industry Expenditures (in 1977 Dollars) for Energy R&D, 1972-1980; Budget Estimates, 1981-1982; New Graduates Working in Energy-Related Activities, in 1976, 1978, 1979, and 1980

Sources: National Science Foundation, *Federal R&D Funding by Budget Function: Fiscal Years, 1980-82* (Washington, D.C.: National Science Foundation, 1981); National Science Foundation, "Federal R&D Funding by Budget Function: Fiscal Years 1979-1982" (unpublished); and U.S. Department of Energy, Office of Energy Research.

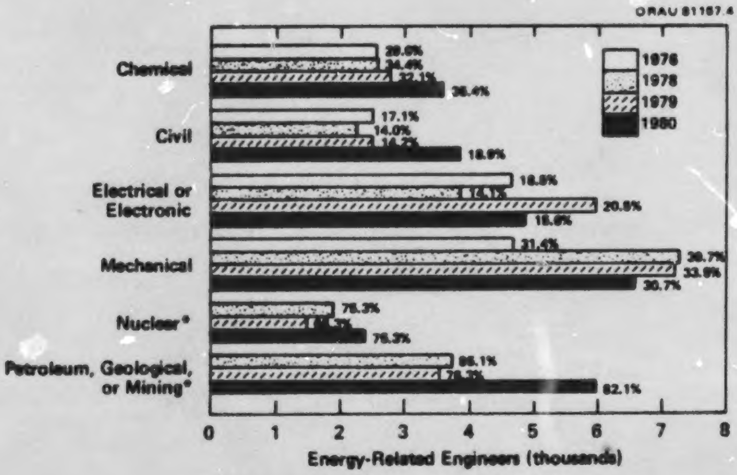
of employment in energy extraction industries (coal, petroleum, natural gas).[4] Although federal expenditures for energy development have declined (in real terms) since 1978, domestic energy production is expected to continue to grow (Figure 1), and energy industries will require a steady stream of new scientists and engineers. Growth is most likely to occur in the fields closely connected to the energy industries (physical and earth/environmental science, petroleum/geological/mining and mechanical engineering), continuing the pattern of the late 1970s (Figures 3 and 4).



* Not tabulated in 1976.

Figure 3. Number of Energy-Related New Graduates Working as Scientists and Percent of Total in Each Occupational Field: 1976, 1978, 1979, and 1980

Source: U.S. Department of Energy, Office of Energy Research.



* Not tabulated in 1976.

Figure 4. Number of Energy-Related New Graduates Working as Engineers and Percent of Total in Each Occupational Field for 1976, 1978, 1979, and 1980

Source: U.S. Department of Energy, Office of Energy Research.

TYPE OF EMPLOYMENT

The rapid expansion of energy industries in the late 1970s provided the impetus for most of the new energy-related jobs. Since 1976, the most important source of growth in the number of energy-related jobs for new graduates has been business and industry, and by 1980 the number of energy-related new graduates employed in this sector had grown 68 percent, from 26,460 to 44,510 (Figure 5). Changes in educational and other employment were minor in comparison. Even though government employment grew more rapidly, doubling during the four years, energy-related recent graduate employment in federal, state, and local governments totalled only 4,610 in 1980, compared to an average annual increase in business/industry employment of 4,500.

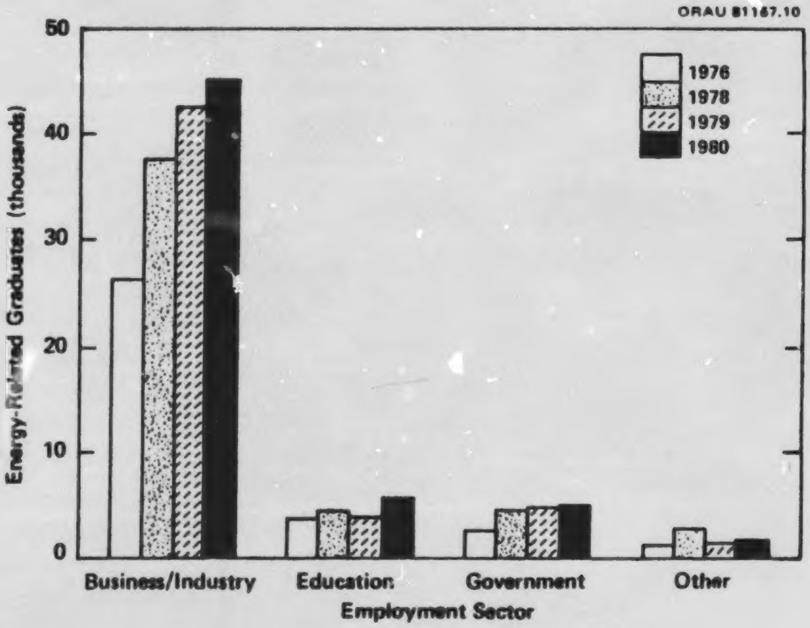


Figure 5. Type of Employer, Energy-Related New Graduates in 1976, 1978, 1979, and 1980

Source: U.S. Department of Energy, Office of Energy Research.

WORK ACTIVITIES

Whether reporting overall work activities or specific energy-related activities, a consistently high proportion of new energy-related engineers working in energy-related cited tasks that might loosely be termed "production-oriented." One-half of these engineers were primarily involved in design, development, or operations work (grouped toward the left on the horizontal axis in Figure 6), and an even higher proportion reported energy activities specifically related to the production, transformation, or distribution of energy (see Figure 7). These included energy extraction, the generation of electric power, manufacture or processing of energy (such as synfuels or petroleum refining), energy transportation, and energy storage (important in solar energy applications).

Although a majority of the energy-related new scientists (65 percent) worked for business/industry, about one-third were employed by educational institutions or federal, state, or local government; and a relatively high proportion of scientists were engaged in research in 1979 and 1980 (see Figure 6). General work activities, such as environmental impact, energy utilization or management, and conservation, drew about one-fourth of these graduates (see Figure 7). In

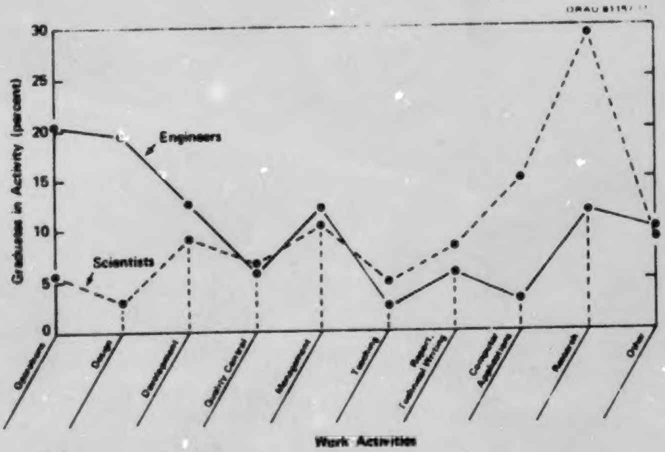


Figure 6. Primary Work Activities Involved in the Occupations of New Graduates Working as Scientists and Engineers in Energy-Related Activities in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

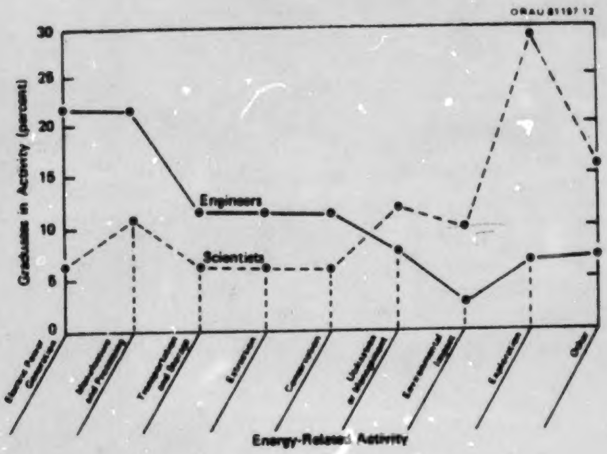


Figure 7. Energy-Related Activities of New Graduates Working as Scientists and Engineers in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

specifically energy-related activities, the largest proportion were engaged in exploration for energy. This is probably the result of heightened activity in the petroleum industry and the large number of scientists (particularly earth/environmental scientists) required in the search for petroleum. Moreover, according to the National Petroleum Council, computerized analysis has become a major tool in petroleum exploration,[5] and this may partially explain the proportion of scientists who cited computer applications as their most important general work activity. In addition, computers are used for modeling studies in environmental impact analysis, and in design work for complex systems, such as nuclear power plants.

SPECIFIC ENERGY INDUSTRIES

Petroleum and Natural Gas

During the seventies, world oil prices rose rapidly, creating strong economic incentives for domestic production of oil and natural gas. American firms have responded with further drilling and recovery in old oil fields as well as increased exploration and drilling of new fields. This kind of activity requires a large number of scientists and engineers, and as reserves become more scarce, as enhanced recovery expands, and as wells are drilled deeper, the number required for each increment of production will increase.[6] By 1979 and 1980, nearly half of the new scientists and engineers working in energy-related activities cited petroleum/natural gas as the energy source on which they spent the most time (Figure 8). The majority of these graduates (roughly 90 percent) worked for private industry, often in production activities (Figure 9). According to the National Petroleum Council, exploration depends most heavily on earth and environmental scientists, especially geophysicists and geologists who analyze surface areas and test for underground oil reservoirs.[7] As exploration and drilling activities quickened, increasing numbers of recent graduates were employed as earth and environmental scientists (Figure 10), over half of whom reported that they work in the petroleum or natural gas energy sector (Tables B-16 to B-18).

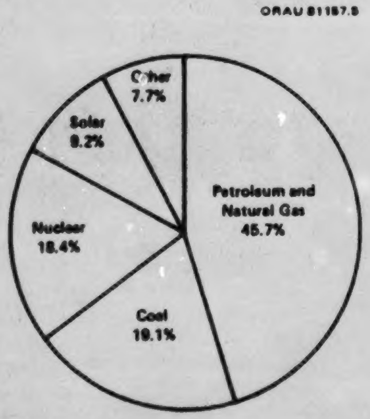


Figure 8. Major Energy Source, Energy-Related New Graduates Working as Scientists and Engineers in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

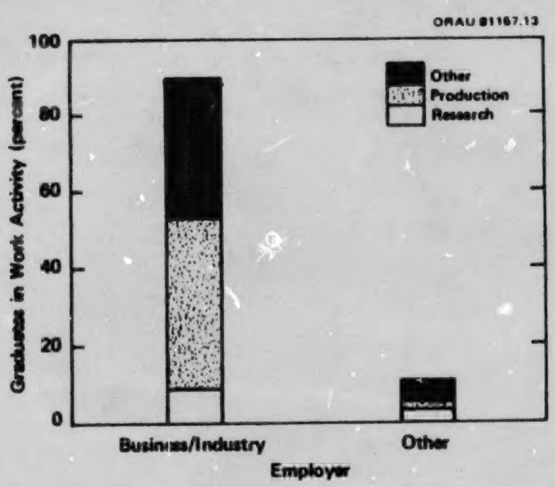


Figure 9. Work Activities of New Graduates Working as Scientists and Engineers with Petroleum Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

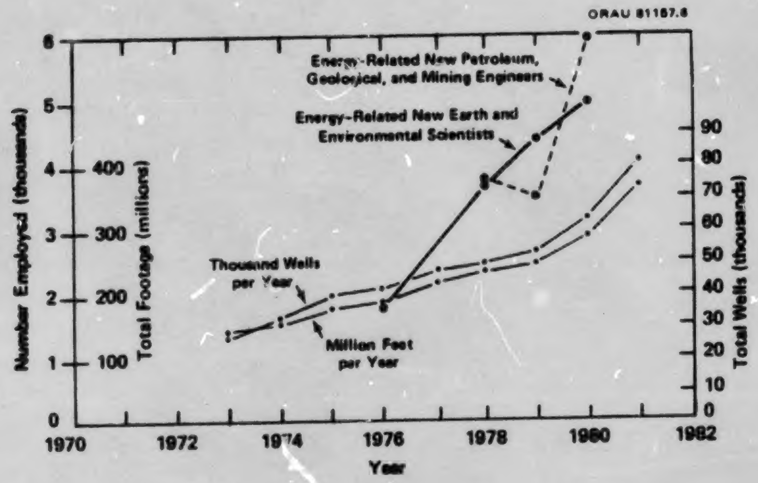


Figure 10. Petroleum Drilling Activity; Energy-Related New Graduates Working as Earth and Enviromental Scientists; and Energy-Related New Graduates Working as Petroleum, Geological, and Mining Engineers in 1976, 1978, 1979, and 1980

Sources: *Oil and Gas Journal* (25 January 1982):147; and U.S. Department of Energy, Office of Energy Research.

Petroleum extraction requires a large number of engineers (Figure 11), and the industry has employed a steadily increasing number of engineers since 1974. A large number of these are petroleum engineers, preferred for their industry-specific background; and Figure 6 shows a sharp three-year increase in the number of graduates hired as petroleum, geological, and mining engineers. (Although there is an apparent decline in 1979, this may result from the small sample size in these fields, rather than an actual decrease in hiring. The sample size for most other fields discussed here is much larger.) Petroleum firms also hire chemical engineers (who often substitute for petroleum engineers), electrical engineers (involved in well-logging operations), and mechanical engineers (involved in drilling and well-servicing operations).[8] The number of new graduates hired as chemical and mechanical engineers for energy-related work has actually increased in both surveys since 1976, while the corresponding number for electrical engineers has remained fairly high (see Figure 4).

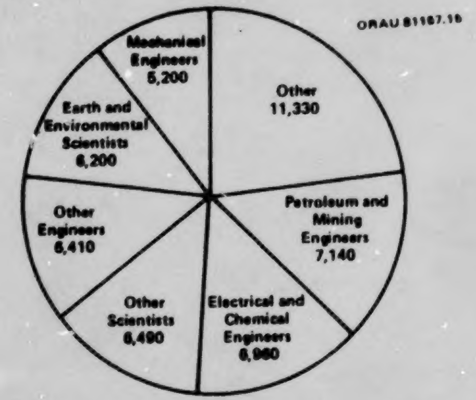


Figure 11. Occupations of New Science and Engineering Graduates Working with Petroleum Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

With the depletion of older oil fields and the increasing well depths required for newer fields, the industry will place even greater emphasis on exploration and advanced recovery methods. Though this will require a continual stream of earth/environmental scientists and engineers, the National Petroleum Council expects no shortages of trained personnel in the 1980s. In fact, the Council observed in 1979 that current demand, and consequently salaries, were so high in these fields that there could be a surplus of graduates by the middle of the decade.[9] However, exploration and drilling efforts have increased more rapidly than the Council expected.[10] If this trend continues, there may be a shortage of qualified graduates throughout the eighties.

Of course, scientists and engineers in several fields are employed by every energy industry and perform a wide variety of tasks. Because of this, changes in the energy-related population in any science or engineering field cannot be attributed solely to trends in a single energy industry.

Coal

In the early 1980s the EIA expects a shift from oil and natural gas toward coal and nuclear power as a result of higher imported oil prices and the decontrol of both domestic oil prices (recently completed) and natural gas prices (as directed by the Natural Gas Policy Act of 1978).[11] If coal use grows as rapidly as projections indicate, production will grow by nearly 50 percent between 1980 and 1990. Though this estimate may be somewhat optimistic, coal does enjoy a price advantage over oil and natural gas in electric power generation. As oil and natural gas become more costly and difficult to obtain, this price advantage may become considerably larger. Relative prices coupled with federal regulations and tax incentives for utilities to use coal, should make coal the cheapest fossil fuel despite higher costs for transportation and pollution control.[12] Further, although the subject is still under debate, some recent studies suggest that by the late 1980s, coal-generated electricity may be cheaper than that generated with nuclear power because of the high capital cost of nuclear power plants.[13] If this occurs, it may further accelerate the demand for coal.

Another development slated for the 1980s is commercial production of oil and natural gas substitutes from coal. The National Energy Security Act of 1980 set a synthetic fuel production goal equivalent to two million barrels of oil per day by the early 1990s.[14] To promote this goal, the Act established a synthetic fuels corporation to provide federal financial support for synthetic fuel projects within the private sector. Projects eligible for support include those that convert coal, shale oil, and tar sands to petroleum equivalents. Projections of rapid, early growth in coal use for synfuels, however, assumed a level of federal financial support that is now unlikely. Current EIA projections indicate that most of the growth in this industry will occur after

1990.[15] Exports form another potential source of industry growth that some business sources expect to develop rapidly in the next few years.[16]

Roughly one-fifth of energy-related scientists and engineers had already focused their professional attention on coal in 1979 and 1980 (see Figure 8), most of them engineers involved in production activities (Figures 12 and 13). If coal production expands as projected, the number of scientists and engineers needed in the industry will increase. Some (especially mining engineers) will be needed to improve mining productivity if coal is to maintain its price advantage over other fossil fuels.[17] Others (chemists, chemical, and mechanical engineers) will be needed to explore more efficient, cleaner ways of burning coal, and to develop the emerging synfuel technologies.

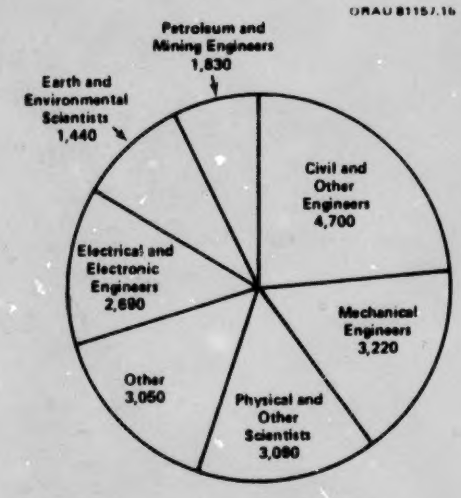


Figure 12. Occupations of New Science and Engineering Graduates Working with Coal Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

Nuclear (Fission and Fusion)

In the last 15 years the amount of electricity produced by nuclear power has grown dramatically, and the EIA projects an increasing share of power production for this energy source in the next decade. Based mainly on plants under construction and more than ten percent complete, the projections show nuclear

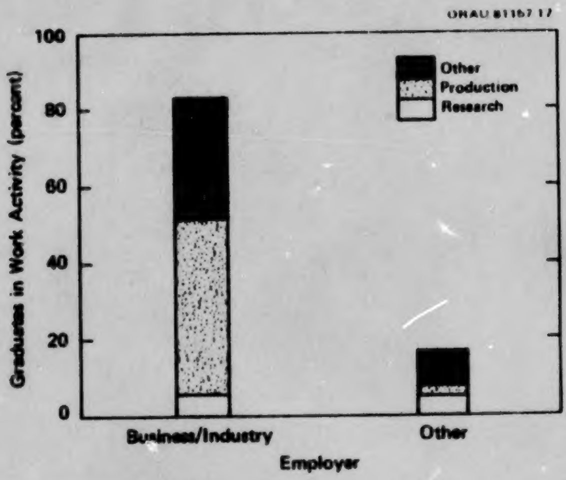


Figure 13. Work Activities of New Graduates Working as Scientists and Engineers with Coal Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

reactors generating more than two and a half times as much electricity in 1990 as they produced in 1978.[18] Perhaps more than any other source of electricity, nuclear power relies on engineers, especially nuclear, mechanical, and electrical/electronic engineers (Figure 14). Though mechanical and electrical/electronic engineers are used in the largest numbers, nuclear engineers are more directly tied to the nuclear industry,[19] and a very high proportion of them reported that they work in energy-related activities (Figure 4).

As Figure 15 shows, engineering employment in nuclear power plants paralleled the growth in nuclear capacity, climbing steeply in the early and late 1970s, with a brief slowdown in the middle of the decade. The data from this survey show that more than one thousand new graduates were hired as nuclear engineers each year from 1978 to 1980. (Like petroleum/geological/mining engineering, the sample size here is much smaller than in the other fields discussed. The apparent decline in 1979 may reflect the small sample size, rather than an actual decline in hiring, especially since engineering employment in the nuclear industry was increasing at that time.) More recently, EIA projections and utility hiring plans[20] indicate that opportunities for these engineers will continue to grow in the 1980s as new plants are brought on line.

Yet projections in this industry are subject to uncertainty. The growth in demand for electricity has slowed in response to the escalating price of energy, and high interest rates have made it costly to build new power plants before they are actually needed. As a result, many utilities have delayed or cancelled the construction of new plants, especially capital-intensive nuclear plants.

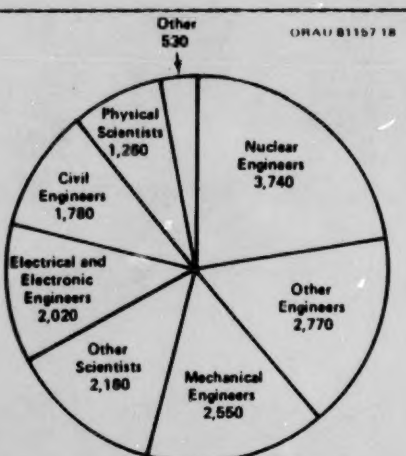


Figure 14. Occupations of New Science and Engineering Graduates Working with Nuclear Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

Public concerns about safety have further slowed their construction and approval, and may continue to restrain the industry's growth.[21] Consequently, opportunities for new graduates in the nuclear industry may grow more slowly than projected and may level off after 1990 when most reactors now under construction are scheduled for completion. The outlook for new graduates is further tempered by the fact that many nuclear engineers are also employed in the design and manufacturing of reactors. No new nuclear power plants have been ordered for several years, and employment in nuclear design and manufacturing has declined since 1977.[22] If only plants currently under construction are built, the role of power plant designers and manufacturers will shrink, and some may seek jobs in power plant operation and maintenance. These experienced nuclear engineers may then fill jobs that would otherwise be available to new graduates.

Nearly one-fifth of the energy-related scientists and engineers cited nuclear energy as the focus of their attention in 1979 and 1980, and a many were engaged in research and development (Figure 16). Some of these

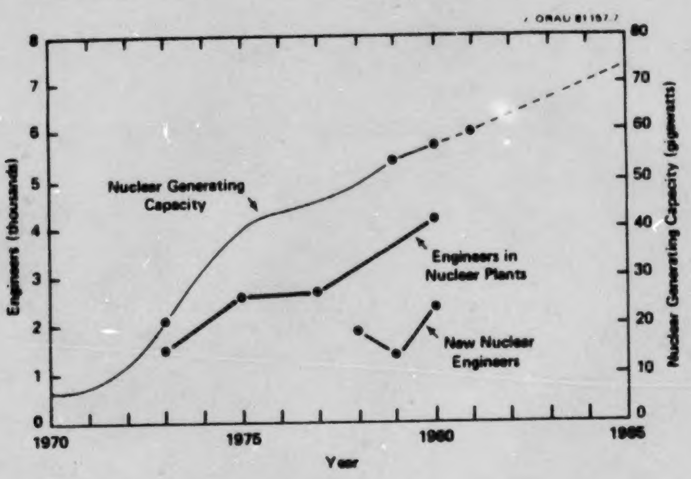


Figure 15. Projected Nuclear Generating Capacity, Nuclear Industry Engineering Employment, and New Graduates Working as Nuclear Engineers

Source: U.S. Department of Energy, Energy Information Administration, *Annual Report to Congress, 1981* (Washington, D.C.: USGPO, 1982); U.S. Department of Energy, Office of Energy Research; Bureau of Labor Statistics, *Nuclear-Related Employment Survey*; and R.C. Johnson, L.M. Blair, and R.L. Craig, "Occupational Employment in Nuclear Power Utilities," Working Paper for U.S. Department of Energy, Office of Nuclear Power Systems, 1981.

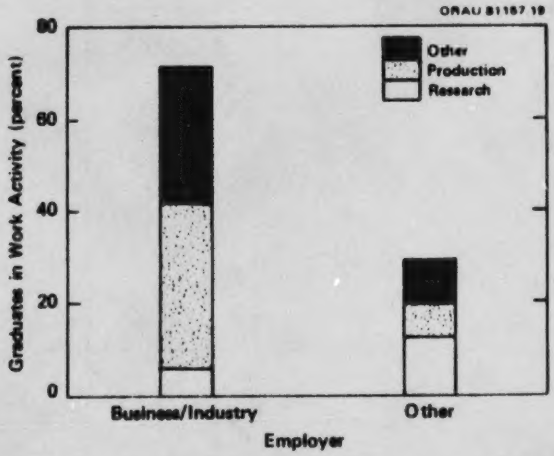


Figure 16. Work Activities of New Graduates Working as Scientists and Engineers with Nuclear Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

graduates may have been working in research and development projects on fission or magnetic fusion energy. Federal funds for these projects have declined since 1978, but the current administration has indicated its support for nuclear power and expects to increase nuclear R&D funding in the 1980s. In addition, the Magnetic Fusion Energy Act of 1980 set as its goal the operation of a magnetic fusion demonstration facility before the end of the century--a feat that, if accomplished, will require significant expansion of current research and development efforts during the next 20 years.[23]

Solar and Other

About one energy-related new graduate in six reported working on energy sources other than nuclear or fossil fuels (Figure 8). Of these, roughly half devoted their professional time to solar energy sources, despite the small amount of energy these sources currently contribute (less than 3 percent of total U.S. consumption in 1980), and the projections for slow market penetration through the end of the century.[24] As Figure 17 shows, these energy technologies (including photovoltaics, flat plate collectors, wind, biomass, geothermal, and hydro-energy) use the skills of mechanical and electrical or electronic engineers, as well as those of physical scientists (especially in photovoltaics).[25] Employment in solar energy in 1979 and 1980 may have been primarily the result of the substantial increase in government funding in the late 1970s, from $83 million in fiscal 1976 to $391 million in fiscal 1979.[26]

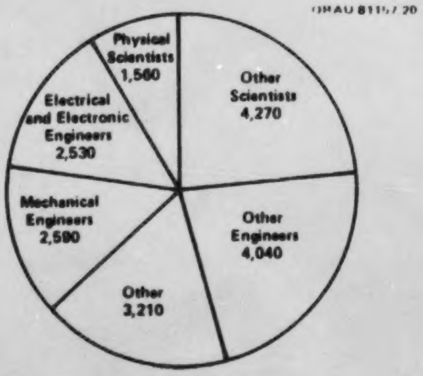


Figure 17. Occupations of New Science and Engineering Graduates Working with Solar and Other Energy Sources in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

Among these graduates, a larger percentage reported research and development as their major activity than did graduates working in other energy areas (Figure 18). Since federal R&D funds for solar are, however, slated for substantial cuts in the 1980s, many individuals may move to other projects unless private funding offsets the federal cuts.

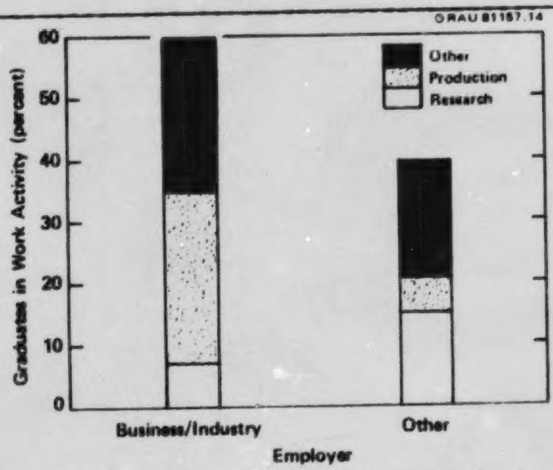


Figure 18. Work Activities of Scientists and Engineers Working with Solar and Other Energy Sources, 1979 and 1980

Source: Westat, Inc./National Science Foundation and U.S. Department of Energy, 1979 and 1980, Survey of Recent Science and Engineering Graduates.

MOBILITY BETWEEN DEGREE AND EMPLOYMENT FIELDS

If the increase in domestic energy production projected by the Energy Information Administration is to become reality, many new scientists and engineers must become involved in energy research, development, and production. Record enrollments in engineering schools[27] should provide an adequate number of graduates in the long term as long as teaching facilities are adequate.[28] But what are the prospects in the near term?

The results of this survey indicate that the market for B.S. and M.S. graduates can compensate for shortages as they arise. In 1979 and 1980, 40 percent of new scientists and engineers working in energy-related activities were employed outside the field in which they held their highest degree. A noticeable part of this movement was into the fields most important to energy industries, such as nuclear and petroleum/geological/mining engineering (Figures 19 and 20). These graduates were undoubtedly responding to the increased job opportunities and rising salaries in high-demand fields.

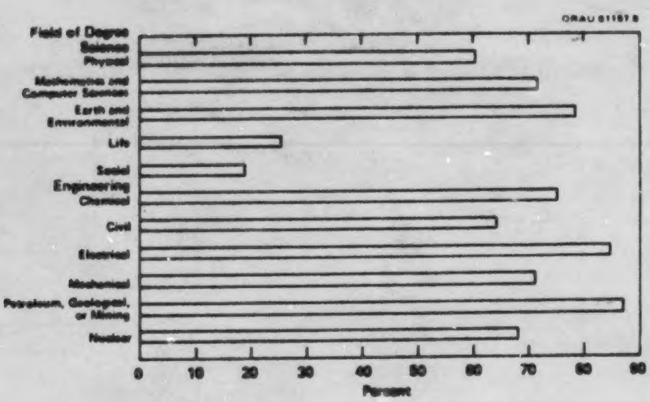
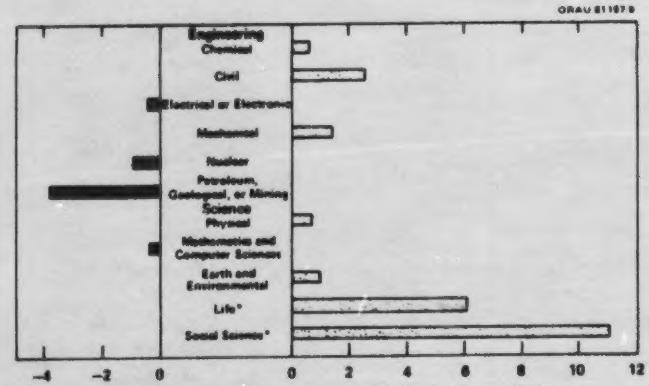


Figure 19. Percent of New Science and Engineering Graduates Working in Energy-Related Activities with Degree and Employment in the Same Field

Source: U.S. Department of Energy, Office of Energy Research.



*Nearly all of those who moved out of the life and social sciences were employed in fields other than science or engineering.

Figure 20. Net Movement into or out of Each Field for New Science and Engineering Graduates Working in Energy-Related Activities in 1979 and 1980

Source: U.S. Department of Energy, Office of Energy Research.

Earth and Environmental Science and Engineering

Petroleum, geological, or mining engineering drew the largest number of graduates from other disciplines, such as physical science and other fields of engineering (see Tables E-3 to E-5). In fact, nearly 50 percent of those employed in these three fields held degrees in other branches of science or engineering. To a lesser extent, earth and environmental science and electrical, mechanical, and nuclear engineering followed the same pattern. For example, in 1979 the National Petroleum Council estimated that perhaps 40 percent of all professional geophysicists held degrees in other fields (physics, mathematics or computer science, engineering),[29] while electrical and mechanical engineering have attracted graduates from physical science and civil engineering, among other fields. As efforts in energy production intensify in the early 1980s, this migration into high demand fields will probably continue. As salaries and opportunities continue to rise, however, more students will choose to enroll in these fields, an adjustment that prompted the National Petroleum Council to predict an adequate supply (perhaps a surplus) of new graduates by the middle of the decade.[30] In fact, the 1979 and 1980 survey results in Figure 9 suggest that adequate numbers of earth and environmental scientists may now be available, although shortages continue in other fields.

Other Fields

As figure 20 illustrates, there were more graduates than jobs in other fields, particularly in the life and social sciences. Less than 20 percent of the graduates in these two disciplines found energy-related work without switching to other fields. Of the rest, the majority (nearly half of the life scientists and three-fourths of the social scientists) were employed outside the broad fields of science and engineering. A few of these positions, however, may have been as managers or administrators of science or engineering projects. Others may have been in positions that do not require college degrees. In contrast, most of the physical scientists, mathematicians, and computer scientists who were not employed in their degree fields found energy-related work in related fields, such as chemical or mechanical engineering.

These survey results suggest that mobility between major fields is an important factor in adjusting to the changing demand for new scientists and engineers. As the demand for and supply of graduates in each field shifts, surpluses or shortages of graduates arise. Until colleges and universities can meet the new demand, new graduates migrating between fields will continue to correct the imbalance. Even so, this short term adjustment may be accompanied by higher training costs or decreased productivity.

SUMMARY

Energy-related industries employed a growing number of new science and engineering graduates between 1976 and 1980. This growth was dominated by the influence of the petroleum and natural gas industry, which grew at a phenomenal rate during the same time period. The disciplines most closely linked to this industry (environmental science and petroleum, geological, or mining engineering), showed evidence of intense demand, and a tight supply of trained graduates. Potential shortages in these disciplines were averted, however, as large numbers of graduates with related training accepted jobs in these fields.

In another energy-specific discipline, a substantial number of new nuclear engineers found energy-related employment in 1978 through 1980, and the nuclear power industry will continue to hire some new engineers through the next decade. However, the rate of growth and long-term prospects in this industry are subject to some uncertainty.

Some fields (especially mechanical and electrical engineering and physical science) have broad applications in each of the energy industries, and their graduates were also hired in increasing numbers for energy-related work. The social and life sciences, in contrast, have limited applications to energy work, and energy-related graduates in these disciplines most often found jobs outside the sphere of science and engineering.

NOTES

1. See for example, P. Abelson, "Shortages of Scientists and Engineers," *Science* 211 (January 9, 1981):123; S. Ramo, "Science and Engineering: The Future," *Science* 211 (February 6, 1981):532; S. Kahne, "A Crisis in Electrical Engineering Manpower," *IEEE Spectrum* (June 1981):50-52; D.A. Bromley, "The Fate of the Seed Corn," *Science* 213 (July 10, 1981):159.

2. U.S. Department of Energy, Energy Information Administration, *Annual Report to Congress: 1981*, Volume 3, *Forecasts* (Washington, D.C.: USGPO, 1982), p. xviii.

3. U.S. Department of Energy, *Securing America's Energy Future: The National Energy Policy Plan* (Washington, D.C.: USGPO, 1981), pp. 21-22.

4. R. Greene, "Employment Trends in Energy Extraction," *Monthly Labor Review* 104 (May 1981):3-8.

5. National Petroleum Council, *Materials and Manpower Requirements for U.S. Oil and Gas Exploration and Production, 1979-1990* (Washington, D.C.: National Petroleum Council, 1979), Appendix J.

6. Ibid., p. 16.

7. Ibid., Appendix J.

8. Ibid.

9. Ibid.

10. *Oil and Gas Journal* (January 25, 1982):147.

11. U.S. Department of Energy, Energy Information Administration, *Annual Report to Congress, Vol. 3: Forecasts*, pp. xvi-xvi.

12. Ibid., pp. 27-29.

13. *Nuclear Power Issues and Choices, Report of the Nuclear Energy Policy Study Group Sponsored by the Ford Foundation and Administered by the MITRE Corporation,* S.M. Keeny, Jr., Chairman (Cambridge, Mass.: Ballinger Publishing Company, 1977), pp. 126, 127; *Energy in Transition 1985-2010, Report of the Committee on Nuclear and Alternative Energy Systems, National Research Council* (San Francisco: W.H. Freeman and Company, 1979), p. 276; "A Review of the Economics of Coal and Nuclear Power," internal DOE report, September 1981 (unpublished); *Power Plant Cost Escalation* (New York: Komanoff Energy Associates, 1981), reviewed in C. Norman, "Study Says Coal Cheaper than Nuclear," *Science* 212 (May 8, 1981):652; and "Comparison of Investor-Owned Utility Nuclear and Coal-Fired Power Plant Generation Costs in 1980" in *Update: Nuclear Power Program Information and Data* (Washington, D.C.: USDOE Office of Coordination and Special Projects and Office of Nuclear Reactor Programs, May-June 1981), pp. 32-45.

14. H. Perry, "Whither Synfuels, " *Resources for the Future* 66 (Spring 1981):2-3.

15. Institute of Gas Technology, *Assessment of the Labor Impacts of Commercialization of Coal Gasification Systems*, DOE/TID/6646-1, (Washington, D.C.: USDOE October 1979), pp. 10-13 and U.S. Department of Energy, Energy Information Administration *Annual Report to Congress, Vol. 3: Forecasts*, p. 95.

16. D.F. White, "The Coal Export Gamble," *Fortune* 104 (December 14, 1981):122-124.

17. U.S. General Accounting Office, *Low Productivity in American Coal Mining: Causes and Cures*, EMD-81-17 (Washington, D.C.: USGAO, March 3, 1981), p. iii.

18. U.S. Department of Energy, Energy Information Administration, *Annual Report to Congress, Vol. 3: Forecasts*, pp. 51, 79.

19. ORAU figures based on U.S. Department of Energy and U.S. Department of Labor, Bureau of Labor Statistics, *1977 Nuclear-Related Employment Survey*.

20. R.C. Johnson, L.M. Blair, and R.L. Craig, "Occupational Employment in Nuclear Power Utilities," Working Paper, for U.S. Department of Energy, Office of Nuclear Power Systems, 1981.

21. H.H. Landsberg, *Energy: The Next Twenty Years* (Cambridge, Massachusetts: Ballinger Publishing Company, 1979), pp. 523-525.

22. J.G. Baker and K. Olsen, *Occupational Employment in Nuclear-Related Activities, 1981*, ORAU-197 (Oak Ridge, Tenn.: Oak Ridge Associated Universities, 1982).

23. U.S. House of Representatives, Report No. 96-1096, *Fusion Energy Research, Development, and Demonstration Act of 1980*, (Washington, D.C.: USGPO, 1980), pp. 3-4.

24. U.S. Department of Energy, *Securing America's Energy Future: The National Energy Policy Plan*, p. 22; and Energy Information Administration, *Annual Report to Congress, Vol. 3, Forecasts*, pp. 85-86.

25. L.M. Blair, W.D. Burnett, and B. Mason, *Solar Energy Employment Information from Case Studies* (Oak Ridge, Tennessee: Oak Ridge Associated Universities, December 1978).

26. *Congressional Quarterly Almanac*, 1975-1978 Annual Editions (Washington, D.C.: Congressional Quarterly, Inc., 1975-1978).

27. W.S. Janna, "The Enrollment Crunch: A National Survey," *Engineering Education* 71 (April 1981):705-708.

28. For a discussion of the adequacy of teaching facilities, see U.S. Department of Energy, Office of Energy Research, *Doctoral Scientists and Engineers Working in Energy-Related Activities, 1979 DOE/ER-0127 (Washington, D.C.: USDOE, 1982)*.

29. *National Petroleum Council, Materials and Manpower Requirements for U.S. Oil and Gas Exploration and Production, 1979-1990*, Appendix J.

30. Ibid.

APPENDIX A. TECHNICAL NOTES

Data Source and Scope

This report is based on surveys of recent science and engineering graduates conducted in 1976, 1978, 1979, and 1980 by Westat, Inc., for the National Science Foundation and the U.S. Department of Energy. Each survey drew a stratified sample of graduates who had obtained bachelor's or master's degrees in specific fields between 1971 and 1979.[1] Stratified sampling allowed the collection of relatively larger samples of small subgroups to improve the reliability of estimates for these subgroups. The overall sample size and the number of graduates represented in each class are shown in Table A-1. Responses to each survey were weighted to represent the total number of graduates in each science or engineering field in each class year. Although the survey included graduates who were employed, unemployed, and not in the labor force, the data presented here includes only those who were employed during a specific reference week in the year of each survey (1976, 1978, 1979, and 1980).

In 1980, the survey indicated that more than 9 percent (or 56,190) of the 589,460 employed recent graduates devoted the largest portion of their professional time to energy- and fuel-related activities. However, this figure probably underestimates the total number of new scientists and engineers whose work is involved with some aspect of energy and fuel. Survey respondents were asked only to indicate the area on which they spent the most time, and many who checked other areas may have spent a smaller amount of time in energy-related activities. Persons exploring the environmental or health effects of energy use may have chosen "health" or "environmental protection, pollution control," even though their work could be considered energy-related.

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[1] For more information on survey methodology, see Westat, Inc., *Methodological Approach to 1978/79 New Entrants Surveys* (Rockville, Md.: Westat, Inc., March 1980).

TABLE A-1. CLASS YEARS AND SAMPLE SIZES IN EACH SURVEY YEAR

Survey Year	Class Years Included in Survey	Graduation Dates	Number of Respondents	Number of Graduates Represented
1980	1979 1978	July 1, 1977-June 30, 1979*	11,129	708,600
1979	1977	July 1, 1976-June 30, 1977	6,328	355,000
	1973	July 1, 1972-June 30, 1973	5,215	354,800
1978	1976	July 1, 1975-June 30, 1976	7,910	377,000
	1972	July 1, 1971-June 30, 1972	6,529	376,000
1976	1975 1974	July 1, 1973-June 30, 1975*	9,812	724,000

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*Since the two classes surveyed in 1980 and in 1976 graduated in consecutive years, they were treated as one class to improve the sample size in small fields.

Differences in 1976, 1978, 1979, and 1980 Surveys

Although all of the surveys asked for the same basic information, there are slight changes in the wording of some choices and in methodology used that could affect the comparability of the data. For example, the choices in the question used to determine energy-relatedness differed in later surveys from those used in 1976; in the earlier survey, "cultural life" was not included, and "education" represented two choices: "teaching" and "other." "Energy and fuel" occupied ninth place on the list in 1976 instead of the first place it occupied in the later surveys. Further, not all graduates were asked to respond to the question in 1976. This may have resulted in some underestimation of energy-related graduates compared with the later surveys. The number of energy-related graduates reported here for the 1976 survey is adjusted with an estimate for the respondents who were not asked this question. In 1976 and 1980, the graduates surveyed had received their degrees one to two years prior to the survey date. In 1978 and 1979, graduates were included who held degrees either two or six years old. While many characteristics of the population are stable for the first six years after graduation, some (such as level of educational attainment) may change significantly in that time.

APPENDIX B. 1979 AND 1980 SURVEY, GRADUATES WORKING IN ENERGY-RELATED ACTIVITIES AND MAJOR ENERGY SOURCE

TABLE B-1 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

MAJOR	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	4,010	1,410	35.3
CIVIL	9,750	1,650	16.9
ELECTRICAL OR ELECTRONIC	16,490	3,410	20.7
MECHANICAL	10,230	3,460	33.8
PETROLEUM,GEOLOGICAL, OR MINING	1,290	840	65.0
NUCLEAR	890	520	58.2
METALLURGICAL AND MATERIALS	510	190	36.4
OTHER ENGINEERING	21,320	3,220	15.1
TOTAL, ENGINEERING	64,490	14,700	22.8
SCIENTISTS			
PHYSICAL	13,890	1,550	11.2
MATH AND COMPUTER	29,260	2,450	8.4
EARTH AND ENVIRONMENTAL	9,600	1,420	14.8
LIFE	47,940	1,090	2.3
SOCIAL	97,770	3,810	3.9
TOTAL, SCIENCE	198,460	10,320	5.2
OTHER	61,870	1,860	3.0
TOTAL	324,820	26,880	8.3

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-2 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

MAJOR	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	4,300	1,480	34.3
CIVIL	10,990	2,050	18.6
ELECTRICAL OR ELECTRONIC	14,730	2,300	15.6
MECHANICAL	10,550	3,610	34.2
PETROLEUM,GEOLOGICAL, OR MINING	1,480	1,180	79.8
NUCLEAR	1,030	770	75.0
METALLURGICAL AND MATERIALS	820	100	12.3
OTHER ENGINEERING	19,700	2,180	11.1
TOTAL, ENGINEERING	63,600	13,670	21.5
SCIENTISTS			
PHYSICAL	13,560	1,660	12.2
MATH AND COMPUTER	24,740	880	3.6
EARTH AND ENVIRONMENTAL	10,430	2,870	27.5
LIFE	64,280	2,510	3.9
SOCIAL	107,290	3,700	3.5
TOTAL, SCIENCE	220,300	11,620	5.3
OTHER	5,450	170	3.1
TOTAL	289,350	25,460	8.8

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-3 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

MAJOR	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	11,600	3,880	33.4
CIVIL	25,350	5,030	19.8
ELECTRICAL OR ELECTRONIC	33,970	4,630	13.6
MECHANICAL	23,120	8,090	35.0
PETROLEUM,GEOLOGICAL, OR MINING	4,570	3,570	78.1
NUCLEAR	1,960	1,570	80.2
METALLURGICAL AND MATERIALS	1,580	500	31.9
OTHER ENGINEERING	42,130	5,510	13.1
TOTAL, ENGINEERING	144,280	32,780	22.7
SCIENTISTS			
PHYSICAL	29,160	3,200	11.0
MATH AND COMPUTER	48,050	2,280	4.8
EARTH AND ENVIRONMENTAL	21,850	5,980	27.4
LIFE	129,130	4,950	3.8
SOCIAL	209,050	6,520	3.1
TOTAL, SCIENCE	437,240	22,930	5.2
OTHER	7,940	480	6.0
TOTAL	589,460	56,190	9.5

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-4 . OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

OCCUPATION	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	3,820	1,330	34.7
CIVIL	8,320	1,090	13.0
ELECTRICAL OR ELECTRONIC	15,320	3,460	22.6
MECHANICAL	9,580	3,420	35.7
PETROLEUM, GEOLOGICAL, OR MINING	1,870	1,490	79.5
NUCLEAR	810	500	61.5
METALLURGICAL AND MATERIALS	640	310	49.2
OTHER ENGINEERING	20,530	3,520	17.1
TOTAL, ENGINEERING	60,890	15,120	24.8
SCIENTISTS			
PHYSICAL	8,850	1,010	11.4
MATH AND COMPUTER	24,300	2,150	8.8
EARTH AND ENVIRONMENTAL	4,960	1,460	29.5
LIFE	22,650	160	0.7
SOCIAL	22,910	530	2.3
TOTAL, SCIENCE	83,670	5,310	6.3
OTHER	179,740	6,450	3.6
TOTAL	324,300	26,880	8.3

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-5 . OCCUPATION: TOTAL VERSUS
ENERGY-RELATED 1977 GRADUATES IN 1979

OCCUPATION	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	4,620	1,380	29.8
CIVIL	9,230	1,400	15.2
ELECTRICAL OR ELECTRONIC	13,750	2,490	18.1
MECHANICAL	11,850	3,750	31.7
PETROLEUM, GEOLOGICAL, OR MINING	2,700	2,000	74.2
NUCLEAR	1,340	930	69.2
METALLURGICAL AND MATERIALS	790	80	9.7
OTHER ENGINEERING	21,290	2,430	11.4
TOTAL, ENGINEERING	65,570	14,460	22.1
SCIENTISTS			
PHYSICAL	11,930	1,470	12.3
MATH AND COMPUTER	24,770	980	3.9
EARTH AND ENVIRONMENTAL	6,390	2,910	45.6
LIFE	31,490	560	1.8
SOCIAL	23,360	900	3.8
TOTAL, SCIENCE	97,940	6,820	7.0
OTHER	125,550	4,180	3.3
TOTAL	289,060	25,460	8.8

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-6 . OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

OCCUPATION	TOTAL	ENERGY-RELATED	PERCENT ENERGY-RELATED
ENGINEERS			
CHEMICAL	10,020	3,550	35.4
CIVIL	20,200	3,820	18.9
ELECTRICAL OR ELECTRONIC	31,060	4,850	15.6
MECHANICAL	21,490	6,590	30.7
PETROLEUM, GEOLOGICAL, OR MINING	7,260	5,960	82.1
NUCLEAR	3,160	2,380	75.3
METALLURGICAL AND MATERIALS	2,370	550	23.2
OTHER ENGINEERING	47,200	6,180	13.1
TOTAL, ENGINEERING	142,760	33,880	23.7
SCIENTISTS			
PHYSICAL	24,560	3,280	13.4
MATH AND COMPUTER	52,240	2,890	5.5
EARTH AND ENVIRONMENTAL	12,570	4,960	39.4
LIFE	68,840	1,790	2.6
SOCIAL	45,590	1,580	3.5
TOTAL, SCIENCE	203,800	14,500	7.1
OTHER	242,210	7,850	3.2
TOTAL	588,770	56,230	9.6

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-7 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS OCCUPATIONS OF ENERGY-RELATED 1973 GRADUATES IN 1979

MAJOR ENERGY SOURCE	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
COAL AND COAL PRODUCTS	19.5	19.1	20.7
PETROLEUM OR NATURAL GAS*	44.6	43.5	47.7
NUCLEAR (FISSION AND FUSION)	19.9	20.9	16.9
SOLAR	8.1	8.4	7.1
OTHER	5.0	4.6	6.0
NO ANSWER	3.0	3.4	1.6
TOTAL	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-8 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS OCCUPATIONS OF ENERGY-RELATED 1977 GRADUATES IN 1979

MAJOR ENERGY SOURCE	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
COAL AND COAL PRODUCTS	22.6	25.3	16.8
PETROLEUM OR NATURAL GAS*	41.5	40.7	43.1
NUCLEAR (FISSION AND FUSION)	17.6	18.8	14.9
SOLAR	10.9	7.9	17.5
OTHER	4.6	3.7	6.5
NO ANSWER	2.8	3.6	1.2
TOTAL	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-9 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS OCCUPATIONS OF ENERGY-RELATED 1978-79 GRADUATES IN 1980

MAJOR ENERGY SOURCE	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
COAL AND COAL PRODUCTS	16.9	17.3	15.7
PETROLEUM OR NATURAL GAS*	46.9	45.7	49.7
NUCLEAR (FISSION AND FUSION)	17.6	20.6	10.5
SOLAR	8.6	7.6	10.8
OTHER	10.0	8.6	13.3
NO ANSWER	0.1	0.1	0.0
TOTAL	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-10 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1973 GRADUATES IN 1979

WORK ACTIVITY	COAL AND COAL PRODUCTS (PERCENT)	PETROLEUM AND NATURAL GAS* (PERCENT)	NUCLEAR (PERCENT)	OTHER (PERCENT)
MANAGEMENT	22.0	22.1	13.2	21.1
RESEARCH	12.1	8.2	17.9	15.2
DESIGN OR DEVELOPMENT	17.1	20.1	24.0	12.4
OPERATIONS	15.8	21.1	11.2	23.2
OTHER	32.9	28.5	33.7	28.1
TOTAL	100.0	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-11 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1977 GRADUATES IN 1979

WORK ACTIVITY	COAL AND COAL PRODUCTS (PERCENT)	PETROLEUM AND NATURAL GAS* (PERCENT)	NUCLEAR (PERCENT)	OTHER (PERCENT)
MANAGEMENT	11.6	16.4	9.0	9.5
RESEARCH	11.6	15.4	10.8	19.5
DESIGN OR DEVELOPMENT	27.2	15.8	20.9	20.0
OPERATIONS	26.9	20.4	10.2	12.5
OTHER	22.7	31.9	49.1	38.4
TOTAL	100.0	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-12 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1978-79 GRADUATES IN 1980

WORK ACTIVITY	COAL AND COAL PRODUCTS (PERCENT)	PETROLEUM AND NATURAL GAS* (PERCENT)	NUCLEAR (PERCENT)	OTHER (PERCENT)
MANAGEMENT	16.6	11.8	9.5	9.2
RESEARCH	11.5	12.4	23.1	26.1
DESIGN OR DEVELOPMENT	23.4	25.4	23.2	18.1
OPERATIONS	15.8	15.8	11.8	11.5
OTHER	32.7	34.6	32.3	35.1
TOTAL	100.0	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-13 . DETAILED MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1973 GRADUATES IN 1979

	COAL AND COAL PRODUCTS		PETROLEUM AND NATURAL GAS*		OTHER	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CIVIL	530	9.8	500	4.0	590	7.2
ELECTRICAL OR ELECTRONIC	820	15.2	1,230	9.9	1,240	15.0
MECHANICAL	730	13.5	1,540	12.4	1,010	12.2
NUCLEAR, PETROLEUM, OR MINING	330	6.1	610	4.9	600	7.3
OTHER ENGINEERING	480	8.9	2,320	18.6	1,700	20.5
TOTAL, ENGINEERING	2,890	53.5	6,200	49.8	5,140	62.2
SCIENTISTS						
PHYSICAL	**	**	430	3.4	840	10.2
EARTH AND ENVIRONMENTAL	340	6.2	730	5.8	270	3.3
OTHER	1,680	31.0	4,260	34.1	1,610	19.5
TOTAL, SCIENCE	2,020	37.2	5,420	43.3	2,720	33.0
TOTAL +	5,410	100.0	12,480	100.0	8,250	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-14 . DETAILED MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1977 GRADUATES IN 1979

	COAL AND COAL PRODUCTS		PETROLEUM AND NATURAL GAS*		OTHER	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CIVIL	570	10.9	800	6.9	670	8.5
ELECTRICAL OR ELECTRONIC	800	15.4	630	5.4	830	10.6
MECHANICAL	1,010	19.6	1,260	10.9	1,240	15.8
NUCLEAR, PETROLEUM, OR MINING	460	8.9	740	6.4	840	10.7
OTHER ENGINEERING	790	15.2	2,010	17.3	460	5.9
TOTAL, ENGINEERING	3,630	70.0	5,440	46.9	4,040	51.5
SCIENTISTS						
PHYSICAL	**	**	500	4.3	780	9.9
EARTH AND ENVIRONMENTAL	250	4.8	2,040	17.5	580	7.4
OTHER	1,310	25.2	3,600	30.9	2,320	29.6
TOTAL, SCIENCE	1,560	30.0	6,140	52.7	3,680	46.9
TOTAL +	5,190	100.0	11,620	100.0	7,850	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-15 . DETAILED MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	COAL AND COAL PRODUCTS		PETROLEUM AND NATURAL GAS*		OTHER	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CIVIL	820	8.7	2,130	7.6	2,090	11.0
ELECTRICAL OR ELECTRONIC	1,000	10.6	1,080	3.9	2,510	13.2
MECHANICAL	1,490	15.8	4,250	15.3	2,350	12.4
NUCLEAR, PETROLEUM, OR MINING	1,090	11.6	2,690	9.7	1,870	9.9
OTHER ENGINEERING	1,580	16.8	5,470	19.7	2,330	12.3
TOTAL, ENGINEERING	5,980	63.5	15,620	56.2	11,150	58.8
SCIENTISTS						
PHYSICAL	850	9.0	820	3.0	1,530	8.1
EARTH AND ENVIRONMENTAL	510	5.4	4,000	14.4	1,470	7.8
OTHER	2,010	21.3	7,080	25.4	4,670	24.7
TOTAL, SCIENCE	3,370	35.7	11,900	42.8	7,670	40.6
TOTAL +	9,420	100.0	27,820	100.0	18,920	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-16 . DETAILED OCCUPATION VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1973 GRADUATES IN 1979

OCCUPATION	COAL AND COAL PRODUCTS NUMBER	COAL AND COAL PRODUCTS PERCENT	PETROLEUM AND NATURAL GAS* NUMBER	PETROLEUM AND NATURAL GAS* PERCENT	OTHER NUMBER	OTHER PERCENT
ENGINEERS						
CIVIL	380	7.1	330	2.7	360	4.4
ELECTRICAL OR ELECTRONIC	840	15.5	1,210	9.7	1,340	16.2
MECHANICAL	690	12.7	1,330	10.6	1,180	14.3
NUCLEAR, PETROLEUM, OR MINING	530	9.7	1,110	8.9	650	7.9
OTHER ENGINEERING	460	8.5	2,590	20.7	1,600	19.4
TOTAL, ENGINEERING	2,900	53.5	6,570	52.6	5,130	62.2
SCIENTISTS						
PHYSICAL	**	**	**	**	660	7.9
EARTH AND ENVIRONMENTAL	440	8.1	770	6.2	260	3.1
OTHER	660	12.3	1,770	14.2	680	8.3
TOTAL, SCIENCE	1,100	20.4	2,540	20.4	1,600	19.3
TOTAL +	5,410	100.0	12,480	100.0	8,260	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-17 . DETAILED OCCUPATION VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1977 GRADUATES IN 1979

	COAL AND COAL PRODUCTS		PETROLEUM AND NATURAL GAS*		OTHER	
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CIVIL	350	6.8	640	5.5	410	5.3
ELECTRICAL OR ELECTRONIC	700	13.5	720	6.2	740	9.5
MECHANICAL	1,280	24.6	1,020	8.8	1,460	18.6
NUCLEAR, PETROLEUM, OR MINING	440	8.5	1,490	12.8	1,070	13.6
OTHER ENGINEERING	900	17.3	2,030	17.4	710	9.1
TOTAL, ENGINEERING	3,670	70.7	5,900	50.7	4,390	56.1
SCIENTISTS						
PHYSICAL	**	**	410	3.5	740	9.4
EARTH AND ENVIRONMENTAL	590	11.4	1,850	15.9	450	5.7
OTHER	550	10.7	690	5.9	1,460	18.6
TOTAL, SCIENCE	1,140	22.1	2,950	25.3	2,650	33.7
TOTAL +	5,180	100.0	11,650	100.0	7,840	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-18 . DETAILED OCCUPATION VERSUS MAJOR ENERGY SOURCE: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	COAL AND COAL PRODUCTS		PETROLEUM AND NATURAL GAS*		OTHER	
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CIVIL	730	7.7	1,250	4.5	1,840	9.7
ELECTRICAL OR ELECTRONIC	1,150	12.2	1,190	4.3	2,470	13.0
MECHANICAL	1,250	13.2	2,850	10.2	2,500	13.2
NUCLEAR, PETROLEUM, OR MINING	1,030	11.0	5,000	18.0	2,840	15.0
OTHER ENGINEERING	1,720	18.3	5,170	18.6	2,840	15.0
TOTAL, ENGINEERING	5,880	62.4	15,460	55.6	12,490	65.9
SCIENTISTS						
PHYSICAL	910	9.6	960	3.4	1,410	7.5
EARTH AND ENVIRONMENTAL	410	4.3	3,580	12.9	970	5.1
OTHER	970	10.2	2,660	9.6	2,630	13.9
TOTAL, SCIENCE	2,290	24.1	7,200	25.9	5,010	26.5
TOTAL +	9,440	100.0	27820	100.0	18,910	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

+ FIELDS OTHER THAN SCIENCE OR ENGINEERING ARE INCLUDED IN TOTAL, BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-19 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS HIGHEST DEGREE HELD: ENERGY-RELATED 1973 GRADUATES IN 1979

	HIGHEST DEGREE HELD					
	BACHELOR'S		MASTER'S OR DOCTORATE		TOTAL	
MAJOR ENERGY SOURCE	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
COAL AND COAL PRODUCTS	3,430	63.5	1,970	36.5	5,400	100.0
PETROLEUM OR NATURAL GAS*	7,870	63.1	4,600	36.9	12,470	100.0
NUCLEAR (FISSION AND FUSION)	1,920	43.7	2,470	56.3	4,390	100.0
SOLAR	1,420	62.6	850	37.4	2,270	100.0
OTHER	700	44.0	890	56.0	1,590	100.0
TOTAL	15,340	58.7	10,780	41.3	26,120	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-20 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS HIGHEST DEGREE HELD: ENERGY-RELATED 1977 GRADUATES IN 1979

	HIGHEST DEGREE HELD					
	BACHELOR'S		MASTER'S OR DOCTORATE		TOTAL	
MAJOR ENERGY SOURCE	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
COAL AND COAL PRODUCTS	4,120	79.5	1,060	20.5	5,180	100.0
PETROLEUM OR NATURAL GAS*	9,010	77.5	2,610	22.5	11,620	100.0
NUCLEAR (FISSION AND FUSION)	1,980	52.5	1,790	47.5	3,770	100.0
SOLAR	1,860	65.0	1,000	35.0	2,860	100.0
OTHER	820	66.7	410	33.3	1,230	100.0
TOTAL	17,790	72.1	6,870	27.9	24,660	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-21 . MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES VERSUS HIGHEST DEGREE HELD: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	HIGHEST DEGREE HELD					
	BACHELOR'S		MASTER'S OR DOCTORATE		TOTAL	
MAJOR ENERGY SOURCE	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
COAL AND COAL PRODUCTS	7,470	79.2	1,960	20.8	9,430	100.0
PETROLEUM OR NATURAL GAS*	22,270	80.1	5,550	19.9	27,820	100.0
NUCLEAR (FISSION AND FUSION)	5,650	65.2	3,020	34.8	8,670	100.0
SOLAR	3,440	69.1	1,540	30.9	4,980	100.0
OTHER	3,820	72.6	1,440	27.4	5,260	100.0
TOTAL	42,650	75.9	13,510	24.1	56,160	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-22 . TYPE OF EMPLOYER VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1973 GRADUATES IN 1979

	ENERGY SOURCE							
	COAL AND COAL PRODUCTS		PETROLEUM OR NATURAL GAS*		NUCLEAR**		OTHER	
TYPE OF EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	4,560	84.4	11,540	92.5	3,140	71.3	3,010	77.9
EDUCATIONAL INSTITUTION	+	+	+	+	360	8.2	450	11.7
ALL GOVERNMENT (CIVILIAN)	520	9.5	390	3.1	890	20.3	340	8.9
OTHER	330	6.1	550	4.4	++	++	++	++
TOTAL	5,410	100.0	12,480	100.0	4,400	100.0	3,850	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDES FISSION AND FUSION.

+ INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

++ INCLUDED IN TOTAL BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-23 . TYPE OF EMPLOYER VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1977 GRADUATES IN 1979

	ENERGY SOURCE							
	COAL AND COAL PRODUCTS		PETROLEUM OR NATURAL GAS*		NUCLEAR**		OTHER	
TYPE OF EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	4,490	86.6	10,200	87.8	2,460	65.2	2,110	51.7
EDUCATIONAL INSTITUTION	350	6.7	660	5.7	480	12.6	670	16.5
ALL GOVERNMENT (CIVILIAN)	+	+	580	5.0	420	11.2	1,070	26.2
OTHER	350	6.6	++	++	410	10.9	++	++
TOTAL	5,190	100.0	11,620	100.0	3,770	100.0	4,080	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDES FISSION AND FUSION.

+ INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

++ INCLUDED IN TOTAL BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE B-24 . TYPE OF EMPLOYER VERSUS MAJOR ENERGY SOURCE INVOLVED IN ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	ENERGY SOURCE							
	COAL AND COAL PRODUCTS		PETROLEUM OR NATURAL GAS*		NUCLEAR**		OTHER	
TYPE OF EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	7,620	80.8	24,650	88.6	6,350	73.3	5,850	57.1
EDUCATIONAL INSTITUTION	900	9.6	1,340	4.8	930	10.7	2,490	24.3
ALL GOVERNMENT (CIVILIAN)	790	8.4	1,490	5.4	920	10.7	1,400	13.7
OTHER	110	1.2	340	1.2	460	5.3	510	5.0
TOTAL	9,420	100.0	27,820	100.0	8,660	100.0	10,250	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

** INCLUDES FISSION AND FUSION.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

APPENDIX C. 1979 AND 1980 SURVEY, ENERGY-RELATED ACTIVITIES

TABLE C-1 . ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1973 GRADUATES IN 1979*

ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	11.9	6.1	29.0
EXTRACTION	11.6	10.8	14.1
MANUFACTURING	12.8	15.3	5.4
FUEL PROCESSING	10.8	10.7	11.2
ELECTRIC POWER GENERATION	27.6	33.1	11.2
TRANSPORTATION OF ENERGY	17.2	18.8	12.5
ENERGY STORAGE	5.7	6.8	2.5
ENERGY UTILIZATION, MANAGEMENT	23.2	22.7	24.5
FUEL REPROCESSING OR DISPOSAL	3.5	2.8	5.7
CONSERVATION	24.1	28.1	12.1
ENVIRONMENTAL IMPACT	12.8	11.1	17.6
EDUCATION, TRAINING	5.8	5.1	8.1
OTHER	5.7	4.4	9.5

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* RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-2 . ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1977 GRADUATES IN 1979*

ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	17.6	8.2	36.1
EXTRACTION	17.8	18.2	17.0
MANUFACTURING	14.7	17.5	9.2
FUEL PROCESSING	11.9	11.6	12.4
ELECTRIC POWER GENERATION	23.0	28.9	11.5
TRANSPORTATION OF ENERGY	13.4	16.6	7.0
ENERGY STORAGE	5.2	4.4	6.9
ENERGY UTILIZATION, MANAGEMENT	18.4	21.5	12.3
FUEL REPROCESSING OR DISPOSAL	4.2	3.6	5.4
CONSERVATION	16.4	20.7	8.0
ENVIRONMENTAL IMPACT	14.1	12.7	16.8
EDUCATION, TRAINING	5.6	6.2	4.5
OTHER	5.1	2.6	9.8

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* RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-3 . ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1978-79 GRADUATES IN 1980*

ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	18.2	10.6	33.7
EXTRACTION	15.9	17.4	12.9
MANUFACTURING	14.5	16.9	9.4
FUEL PROCESSING	11.9	11.3	13.0
ELECTRIC POWER GENERATION	24.1	30.1	11.7
TRANSPORTATION OF ENERGY	16.1	17.6	13.1
ENERGY STORAGE	5.3	5.8	4.2
ENERGY UTILIZATION, MANAGEMENT	14.1	13.4	15.5
FUEL REPROCESSING OR DISPOSAL	4.1	2.9	6.5
CONSERVATION	17.5	20.0	12.3
ENVIRONMENTAL IMPACT	14.7	10.2	24.0
EDUCATION, TRAINING	7.1	5.0	11.3
OTHER	6.8	6.4	7.6

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* RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-4 . MAJOR ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1973 GRADUATES IN 1979

ENERGY-RELATED ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	8.3	3.3	23.0
EXTRACTION	6.7	7.5	4.4
MANUFACTURE AND PROCESSING	15.2	16.3	12.1
ELECTRIC POWER GENERATION	20.8	25.9	5.7
TRANSPORTATION AND STORAGE	11.7	13.5	6.5
ENERGY UTILIZATION, MANAGEMENT	11.7	11.1	13.6
CONSERVATION	12.4	14.5	6.3
ENVIRONMENTAL IMPACT	5.1	2.9	11.5
OTHER	8.0	5.0	16.8
TOTAL	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-5 . MAJOR ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1977 GRADUATES IN 1979

ENERGY-RELATED ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	13.1	4.6	29.9
EXTRACTION	11.6	13.8	7.3
MANUFACTURE AND PROCESSING	19.6	22.7	13.3
ELECTRIC POWER GENERATION	16.5	21.1	7.4
TRANSPORTATION AND STORAGE	8.8	11.7	3.1
ENERGY UTILIZATION, MANAGEMENT	8.2	8.1	8.6
CONSERVATION	7.3	8.8	4.5
ENVIRONMENTAL IMPACT	6.5	4.2	11.2
OTHER	8.3	5.1	14.8
TOTAL	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-6 . MAJOR ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED 1978-79 GRADUATES IN 1980

ENERGY-RELATED ACTIVITY	SCIENTISTS AND ENGINEERS (PERCENT)	ENGINEERS (PERCENT)	SCIENTISTS (PERCENT)
EXPLORATION	14.7	8.3	29.8
EXTRACTION	9.9	11.8	5.7
MANUFACTURE AND PROCESSING	18.8	22.9	9.3
ELECTRIC POWER GENERATION	15.9	20.3	5.6
TRANSPORTATION AND STORAGE	9.5	10.7	6.8
ENERGY UTILIZATION, MANAGEMENT	7.7	5.6	12.5
CONSERVATION	9.3	10.7	5.9
ENVIRONMENTAL IMPACT	3.8	1.6	8.8
OTHER	10.4	8.1	15.7
TOTAL	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-7 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1973 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY									
	EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		CONSERVATION, USE, OR MANAGEMENT		OTHER	
WORK ACTIVITY	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
MANAGEMENT	510	20.1	360	14.2	400	11.9	1,320	27.2	940	19.2
RESEARCH	560	21.9	430	16.8	*	*	250	5.1	890	18.2
DEVELOPMENT	*	*	340	13.1	*	*	680	14.1	*	*
DESIGN	290	11.5	440	16.9	850	25.4	470	9.7	*	*
OPERATIONS	280	10.9	450	17.4	590	17.6	670	13.9	630	12.9
OTHER	910	35.6	560	21.6	1,520	45.3	1,450	30.0	2,430	49.8
TOTAL	2,550	100.0	2,580	100.0	3,360	100.0	4,840	100.0	4,890	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-8 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1977 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY									
	EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		CONSERVATION, USE, OR MANAGEMENT		OTHER	
WORK ACTIVITY	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
MANAGEMENT	180	4.4	*	*	350	12.7	810	22.0	670	14.8
RESEARCH	950	22.7	520	14.3	180	6.6	410	11.2	490	10.8
DEVELOPMENT	420	9.9	570	15.6	*	*	240	6.6	*	*
DESIGN	360	8.6	450	12.3	420	15.2	430	11.7	*	*
OPERATIONS	1,110	26.4	590	16.1	750	26.9	620	16.7	690	15.3
OTHER	1,180	28.0	1,520	41.7	1,080	38.6	1,170	31.8	2,680	59.1
TOTAL	4,200	100.0	3,650	100.0	2,780	100.0	3,680	100.0	4,530	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-9 . PRIMARY WORK ACTIVITY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	ENERGY-RELATED ACTIVITY									
	EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		CONSERVATION, USE, OR MANAGEMENT		OTHER	
WORK ACTIVITY	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
MANAGEMENT	1,200	9.8	910	8.7	900	11.1	1,370	13.3	2,240	15.0
RESEARCH	2,470	20.1	1,380	13.2	880	10.9	1,260	12.3	3,210	21.5
DEVELOPMENT	1,820	14.8	2,120	20.3	360	4.4	870	8.5	530	3.6
DESIGN	730	5.9	1,830	17.6	1,860	22.9	1,400	13.6	1,650	11.0
OPERATIONS	2,800	22.8	1,590	15.3	1,480	18.2	920	8.9	1,240	8.3
OTHER	3,280	26.7	2,620	25.0	2,650	32.6	4,470	43.5	6,070	40.6
	12,300	100.0	10,450	100.0	8,130	100.0	10,290	100.0	14,940	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-10 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1973 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY							
MAJOR	EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING		ELECTRIC POWER GENERATION		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	600	11.6	*	*	290	5.2	*	*
CIVIL	370	7.2	350	10.5	*	*	360	8.9
ELECTRICAL OR ELECTRONIC	*	*	710	21.2	630	11.2	840	20.6
MECHANICAL	460	9.1	1,060	31.3	750	13.3	*	*
NUCLEAR, PETROLEUM, OR MINING	580	11.3	260	7.7	220	3.9	170	4.1
OTHER ENGINEERING	860	16.8	660	19.6	1,260	22.2	960	23.7
TOTAL, ENGINEERING	2,870	56.0	3,040	90.3	3,150	55.8	2,330	57.3
SCIENTISTS								
PHYSICAL	510	9.9	+	+	+	+	540	13.3
EARTH AND ENVIRONMENTAL	810	15.9	+	+	+	+	*	*
OTHER SCIENCE	550	10.8	+	+	1,210	21.4	900	21.9
TOTAL, SCIENCE	1,870	36.6	310	9.2	1,740	30.8	1,440	35.2
OTHER	380	7.4	+	+	760	13.4	+	+
TOTAL	5,120	100.0	3,360	100.0	5,650	100.0	4,070	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-11 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS
MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1977 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY							
MAJOR	EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING		ELECTRIC POWER GENERATION		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	[illegible]	8.5	+	+	380	8.0	+	+
CIVIL	540	6.9	560	20.2	300	6.4	310	9.1
ELECTRICAL OR ELECTRONIC	*	*	370	13.4	410	8.7	510	14.6
MECHANICAL	1,040	13.3	670	24.0	570	11.9	280	8.0
NUCLEAR, PETROLEUM, OR MINING	1,010	12.8	260	9.3	220	4.5	220	6.5
OTHER ENGINEERING	720	9.2	+	+	+	+	+	+
TOTAL, ENGINEERING	3,980	50.7	2,090	75.2	2,310	48.4	1,680	48.7
SCIENTISTS								
PHYSICAL	560	7.1	+	+	+	+	350	10.2
EARTH AND ENVIRONMENTAL	1,890	24.1	+	+	+	+	*	*
OTHER SCIENCE	1,390	17.6	+	+	1,890	39.6	1,410	40.7
TOTAL, SCIENCE	3,840	48.8	700	24.9	2,330	48.8	1,760	50.9
OTHER	+	+	0.0	0.0	+	+	+	+
TOTAL	7,850	100.0	2,790	100.0	4,770	100.0	3,450	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.
+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.
NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-12 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	ENERGY-RELATED ACTIVITY							
MAJOR	EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING		ELECTRIC POWER GENERATION		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	1,970	8.7	240	2.9	1,210	9.7	460	3.6
CIVIL	1,750	7.7	1,560	19.1	650	5.2	1,080	8.5
ELECTRICAL OR ELECTRONIC	1,070	4.7	1,440	17.7	530	4.2	1,600	12.5
MECHANICAL	3,530	15.5	1,960	24.1	1,680	13.4	920	7.2
NUCLEAR, PETROLEUM, OR MINING	3,640	16.0	910	11.2	380	3.0	720	5.6
OTHER ENGINEERING	1,780	7.8	730	9.0	1,800	14.4	1,200	9.4
TOTAL, ENGINEERING	13,740	60.4	6,840	84.0	6,250	49.9	5,980	46.8
SCIENTISTS								
PHYSICAL	1,040	4.6	290	3.5	1,090	8.7	760	6.0
EARTH AND ENVIRONMENTAL	4,240	18.6	140	1.8	550	4.4	1,050	8.2
OTHER SCIENCE	3,600	15.8	860	10.6	4,540	36.3	4,710	37.0
TOTAL, SCIENCE	8,880	39.0	1,290	15.9	6,180	49.4	6,520	51.2
OTHER	+	+	+	+	+	+	+	+
TOTAL	22,750	100.0	8,140	100.0	12,510	100.0	12,750	100.0

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-13 . DETAILED OCCUPATION VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1973 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY							
OCCUPATION	EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING		ELECTRIC POWER GENERATION		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	600	11.6	*	*	370	6.6	*	*
CIVIL	270	5.2	280	8.2	*	*	190	4.7
ELECTRICAL OR ELECTRONIC	*	*	680	20.1	590	10.4	830	20.3
MECHANICAL	560	11.0	940	28.0	820	14.6	*	*
NUCLEAR, PETROLEUM, OR MINING	1,060	20.7	280	8.3	220	3.9	200	5.0
OTHER ENGINEERING	620	12.3	810	24.0	1,280	22.6	910	22.4
TOTAL, ENGINEERING	3,110	60.8	2,990	88.6	3,280	58.1	2,130	52.4
SCIENTISTS								
PHYSICAL	*	*	+	+	*	*	+	+
EARTH AND ENVIRONMENTAL	800	15.6	+	+	340	6.1	+	+
OTHER SCIENCE	740	14.4	+	+	880	15.6	+	+
TOTAL, SCIENCE	1,540	30.0	+	+	1,220	21.7	910	22.2
OTHER	470	9.1	+	+	1,130	20.1	1,040	25.4
TOTAL	5,120	100.0	3,370	100.0	5,630	100.0	4,080	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-14 . DETAILED OCCUPATION VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1977 GRADUATES IN 1979

OCCUPATION	ENERGY-RELATED ACTIVITY EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING NUMBER	 PERCENT	ELECTRIC POWER GENERATION NUMBER	 PERCENT	ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT NUMBER	 PERCENT	OTHER NUMBER	 PERCENT
ENGINEERS								
CHEMICAL	580	7.4	*	*	350	7.3	*	*
CIVIL	390	4.9	440	15.7	*	*	*	*
ELECTRICAL OR ELECTRONIC	410	5.2	*	*	390	8.1	440	12.7
MECHANICAL	800	10.2	900	32.5	480	10.0	280	8.0
NUCLEAR, PETROLEUM, OR MINING	1,680	21.4	440	15.8	170	3.5	360	10.4
OTHER ENGINEERING	650	8.3	530	19.1	930	19.5	770	22.0
TOTAL, ENGINEERING	4,510	57.4	2,310	83.1	2,320	48.4	1,850	53.1
SCIENTISTS								
PHYSICAL	540	6.9	+	+	+	+	+	+
EARTH AND ENVIRONMENTAL	1,810	23.1	+	+	+	+	+	+
OTHER SCIENCE	430	5.5	+	+	+	+	+	+
TOTAL, SCIENCE	2,780	35.5	410	14.7	1,330	28.0	990	28.7
OTHER	+	+	+	+	1,120	23.5	630	18.3
TOTAL	7,840	100.0	2,780	100.0	4,770	100.0	3,470	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-15 . DETAILED OCCUPATION VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1978-79 GRADUATES IN 1980

OCCUPATION	ENERGY-RELATED ACTIVITY							
	EXPLORATION, EXTRACTION, MANUFACTURE, OR PROCESSING		ELECTRIC POWER GENERATION		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	1,950	8.6	150	1.8	1,090	8.8	360	2.8
CIVIL	1,110	4.9	1,280	15.7	480	3.9	940	7.4
ELECTRICAL OR ELECTRONIC	1,310	5.7	1,520	18.7	460	3.6	1,560	12.3
MECHANICAL	2,100	9.2	2,000	24.6	1,750	14.0	750	5.9
NUCLEAR, PETROLEUM, OR MINING	6,110	26.9	1,130	14.0	410	3.3	1,220	9.6
OTHER ENGINEERING	1,970	8.6	800	9.9	1,880	15.1	1,530	12.0
TOTAL, ENGINEERING	14,550	63.9	6,880	84.7	6,070	48.7	6,360	50.0
SCIENTISTS								
PHYSICAL	910	4.0	320	3.9	1,080	8.6	970	7.6
EARTH AND ENVIRONMENTAL	4,080	17.9	*	*	260	2.1	510	4.0
OTHER SCIENCE	1,450	6.4	490	6.0	2,580	20.7	1,760	13.8
TOTAL, SCIENCE	6,440	28.3	810	9.9	3,920	31.4	3,240	25.4
OTHER	1,770	7.8	440	5.4	2,490	19.9	3,150	24.7
TOTAL	22,760	100.0	8,130	100.0	12,480	100.0	12,750	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-16 . ANNUAL SALARY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1973 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY											
ANNUAL SALARY (DOLLARS)	EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		TRANSPORTATION OR STORAGE		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
15,000 OR LESS	*	*	*	*	*	*	*	*	440	7.9	450	28.0
15,001 TO 20,000	380	15.3	330	13.5	350	10.7	*	*	1,090	19.6	440	27.9
20,001 TO 25,000	680	27.6	1,020	41.1	1,900	58.2	1,010	41.2	2,730	49.4	400	24.9
25,001 TO 30,000	570	23.1	570	23.2	550	16.7	500	20.4	970	17.5	250	15.4
OVER 30,000	690	28.1	*	*	*	*	*	*	*	*	*	*
TOTAL	2,470	100.0	2,480	100.0	3,280	100.0	2,450	100.0	5,540	100.0	1,600	100.0

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* INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-17 . ANNUAL SALARY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1977 GRADUATES IN 1979

	ENERGY-RELATED ACTIVITY											
ANNUAL SALARY (DOLLARS)	EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		TRANSPORTATION OR STORAGE		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
15,000 OR LESS	940	23.1	760	21.1	400	15.1	680	34.2	1,860	40.4	750	53.2
15,001 TO 20,000	1,190	29.1	1,860	51.4	1,410	52.9	750	37.6	1,920	41.6	420	30.1
20,001 TO 25,000	1,710	41.8	910	25.2	510	19.2	420	20.8	710	15.4	190	13.4
25,001 TO 30,000	*	*	*	*	*	*	*	*	*	*	*	*
OVER 30,000	*	*	*	*	*	*	*	*	*	*	*	*
TOTAL	4,080	100.0	3,610	100.0	2,660	100.0	2,000	100.0	4,610	100.0	1,400	100.0

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* INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE C-18 . ANNUAL SALARY VERSUS MAJOR ENERGY-RELATED ACTIVITY: ENERGY-RELATED 1978-79 GRADUATES IN 1980

ANNUAL SALARY (DOLLARS)	ENERGY-RELATED ACTIVITY EXPLORATION OR EXTRACTION		MANUFACTURING OR PROCESSING		ELECTRIC POWER GENERATION		TRANSPORTATION OR STORAGE		ENERGY MANAGEMENT, CONSERVATION, OR ENVIRONMENTAL IMPACT		OTHER	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
15,000 OR LESS	1,250	10.6	1,660	17.1	990	12.4	1,200	22.1	2,740	22.6	2,230	32.4
15,001 TO 20,000	2,730	23.1	2,990	30.8	1,810	22.6	1,410	26.0	4,050	33.4	2,190	31.8
20,001 TO 25,000	4,430	37.4	3,850	39.5	4,170	52.2	2,000	36.8	3,960	32.7	1,660	24.2
25,001 TO 30,000	2,740	23.1	1,000	10.2	730	9.1	610	11.2	1,120	9.2	320	4.7
OVER 30,000	680	5.8	240	2.4	300	3.7	*	*	260	2.1	*	*
TOTAL	11,830	100.0	9,740	100.0	8,000	100.0	5,430	100.0	12,130	100.0	6,870	100.0

* INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

APPENDIX D. 1979 AND 1980 SURVEY, TIME SPENT ON ENERGY-RELATED ACTIVITIES

TABLE D-1 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1973 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	600	5.7	230	4.6	260	8.8
CIVIL	770	7.3	250	4.9	230	7.6
ELECTRICAL OR ELECTRONIC	1,420	13.6	620	12.4	490	16.3
MECHANICAL	1,450	13.8	890	17.7	350	11.6
NUCLEAR, PETROLEUM, OR MINING	910	8.7	250	5.0	*	*
OTHER ENGINEERING	1,710	16.3	+	+	560	18.8
TOTAL, ENGINEERING	6,860	65.4	2,850	56.7	1,890	63.1
SCIENTISTS						
PHYSICAL	760	7.3	340	6.8	330	11.0
MATH AND COMPUTER	540	5.2	530	10.6	+	+
EARTH AND ENVIRONMENTAL	950	9.1	*	*	+	+
OTHER SCIENCE	700	6.7	800	16.1	+	+
TOTAL, SCIENCE	2,950	28.3	1,670	33.5	810	27.0
OTHER	670	6.4	490	9.7	+	+
TOTAL	10,480	100.0	5,010	100.0	3,000	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-2 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1977 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	550	5.4	370	6.0	240	7.0
CIVIL	1,130	11.2	410	6.7	180	5.2
ELECTRICAL OR ELECTRONIC	840	8.3	470	7.7	420	12.0
MECHANICAL	1,360	13.5	920	15.0	340	9.7
NUCLEAR, PETROLEUM, OR MINING	1,330	13.1	320	5.2	*	*
OTHER ENGINEERING	480	4.7	+	+	830	24.0
TOTAL, ENGINEERING	5,690	56.2	2,950	48.0	2,010	57.9
SCIENTISTS						
PHYSICAL	560	5.5	550	9.0	+	+
MATH AND COMPUTER	510	5.1	*	*	+	+
EARTH AND ENVIRONMENTAL	1,780	17.6	550	8.9	+	+
OTHER SCIENCE	1,560	15.4	1,960	31.9	+	+
TOTAL, SCIENCE	4,410	43.6	3,060	49.8	1,440	41.6
OTHER	+	+	+	+	+	+
TOTAL	10,130	100.0	6,140	100.0	3,460	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-3 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	1,540	6.4	660	6.4	650	13.4
CIVIL	2,390	10.0	730	7.0	280	5.9
ELECTRICAL OR ELECTRONIC	1,900	7.9	1,180	11.3	640	13.3
MECHANICAL	3,000	12.6	1,200	11.5	750	15.5
NUCLEAR, PETROLEUM, OR MINING	3,190	13.3	380	3.7	230	4.8
OTHER ENGINEERING	1,620	6.8	1,340	12.9	420	8.7
TOTAL, ENGINEERING	13,640	57.0	5,490	52.8	2,970	61.6
SCIENTISTS						
PHYSICAL	1,110	4.6	800	7.6	330	6.9
MATH AND COMPUTER	880	3.7	550	5.3	*	*
EARTH AND ENVIRONMENTAL	3,840	16.0	1,080	10.4	240	4.9
OTHER SCIENCE	4,300	18.0	2,360	22.7	1,230	25.4
TOTAL, SCIENCE	10,130	42.3	4,790	46.0	1,800	37.2
OTHER	+	+	+	+	+	+
TOTAL	23,940	100.0	10,420	100.0	4,830	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-4 . OCCUPATION VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1973 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	620	5.9	320	6.4	*	*
CIVIL	530	5.1	*	*	*	*
ELECTRICAL OR ELECTRONIC	1,260	12.0	470	9.4	590	19.8
MECHANICAL	1,640	15.7	920	18.3	*	*
NUCLEAR, PETROLEUM, OR MINING	1,280	12.2	370	7.4	*	*
OTHER ENGINEERING	1,590	15.2	870	17.3	1,150	38.3
TOTAL, ENGINEERING	6,920	66.1	3,110	61.9	1,740	57.8
SCIENTISTS						
PHYSICAL	600	5.7	+	+	+	+
MATH AND COMPUTER	320	3.1	+	+	+	+
EARTH AND ENVIRONMENTAL	1,080	10.3	+	+	+	+
OTHER SCIENCE	380	3.6	+	+	+	+
TOTAL, SCIENCE	2,380	22.7	1,040	20.9	510	17.1
OTHER	1,180	11.3	850	17.1	750	25.0
TOTAL	10,480	100.0	5,000	100.0	3,000	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-5 . OCCUPATION VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1977 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	490	4.9	300	4.9	240	6.8
CIVIL	720	7.1	210	3.4	300	8.6
ELECTRICAL OR ELECTRONIC	650	6.5	530	8.7	420	12.2
MECHANICAL	1,520	15.0	770	12.6	570	16.5
NUCLEAR, PETROLEUM, OR MINING	2,080	20.6	530	8.7	*	*
OTHER ENGINEERING	780	7.8	850	13.9	580	16.9
TOTAL, ENGINEERING	6,240	61.9	3,190	52.2	2,110	61.0
SCIENTISTS						
PHYSICAL	380	3.7	600	9.7	+	+
MATH AND COMPUTER	630	6.2	+	+	+	+
EARTH AND ENVIRONMENTAL	1,830	18.1	480	7.9	+	+
OTHER SCIENCE	290	2.9	350	5.6	420	12.2
TOTAL, SCIENCE	3,130	30.9	1,640	26.6	840	24.0
OTHER	740	7.3	1,310	21.3	510	14.9
TOTAL	10,110	100.0	6,140	100.0	3,460	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.
+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-6 . OCCUPATION VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
OCCUPATION	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS						
CHEMICAL	1,290	5.4	650	6.3	520	10.8
CIVIL	1,770	7.4	510	4.9	330	6.8
ELECTRICAL OR ELECTRONIC	1,800	7.5	1,260	12.1	720	14.9
MECHANICAL	2,610	10.9	1,130	10.8	650	13.5
NUCLEAR, PETROLEUM, OR MINING	5,040	21.1	740	7.1	330	6.9
OTHER ENGINEERING	2,310	9.7	1,490	14.3	370	7.7
TOTAL, ENGINEERING	14,820	62.0	5,780	55.5	2,920	60.6
SCIENTISTS						
PHYSICAL	1,380	5.8	720	6.9	310	6.4
MATH AND COMPUTER	940	3.9	910	8.7	290	6.0
EARTH AND ENVIRONMENTAL	3,350	14.0	690	6.6	170	3.6
OTHER SCIENCE	1,270	5.3	970	9.3	500	10.4
TOTAL, SCIENCE	6,940	29.0	3,290	31.5	1,270	26.4
OTHER	2,160	9.0	1,350	12.9	630	13.1
TOTAL	23,920	100.0	10,420	100.0	4,820	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-7 . TYPE OF EMPLOYER VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1973 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	8,380	79.9	4,100	82.0	2,380	79.3
EDUCATION	720	6.9	*	*	390	13.1
GOVERNMENT (CIVILIAN)	1,320	12.6	420	8.4	+	+
OTHER	+	+	480	9.6	+	+
TOTAL	10,480	100.0	5,000	100.0	3,000	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-8 . TYPE OF EMPLOYER VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1977 GRADUATES IN 1979

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	8,230	81.3	4,480	73.0	2,360	68.1
EDUCATION	580	5.8	1,060	17.2	410	11.9
GOVERNMENT (CIVILIAN)	820	8.1	420	6.8	470	13.7
OTHER	490	4.9	*	*	*	*
TOTAL	10,120	100.0	6,140	100.0	3,460	100.0

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* INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE D-9 . TYPE OF EMPLOYER VERSUS TIME SPENT ON ENERGY-RELATED ACTIVITIES: ENERGY-RELATED 1978-79 GRADUATES IN 1980

	PERCENT OF TIME SPENT ON ENERGY-RELATED ACTIVITIES					
	100		50-99		49 OR LESS	
EMPLOYER	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
PRIVATE INDUSTRY	19,270	80.5	7,880	75.7	3,150	65.3
EDUCATION	1,400	5.8	1,630	15.6	900	18.8
GOVERNMENT (CIVILIAN)	2,650	11.1	730	7.0	590	12.2
OTHER	600	2.5	180	1.8	180	3.7
TOTAL	23,920	100.0	10,420	100.0	4,820	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

APPENDIX E. 1979 AND 1980 SURVEY, BIOGRAPHICAL CHARACTERISTICS

TABLE E-1. COMPARISON OF MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION: TOTAL VERSUS ENERGY-RELATED GRADUATES IN 1979 AND 1980

	TOTAL			PERCENT WITH OCCUPATION SAME AS COLLEGE MAJOR		
	1980 SURVEY	1979 SURVEY		1980 SURVEY	1979 SURVEY	
MAJOR	1978-79 GRADUATES (THOUSANDS)	1973 GRADUATES (THOUSANDS)	1977 GRADUATES (THOUSANDS)	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)
SCIENCE AND ENGINEERING						
TOTAL	581	263	284	55.2	48.4	52.3
ENERGY-RELATED	56	25	25	79.1	73.1	76.3
ENGINEERING						
TOTAL	144	64	64	87.8	79.4	87.5
ENERGY-RELATED	33	15	14	93.6	91.4	95.0
SCIENCE						
TOTAL	437	198	220	44.4	38.3	42.2
ENERGY-RELATED	23	10	12	58.4	47.0	54.4

NOTES: IN THIS TABLE THE SCIENCE AND ENGINEERING FIELDS ARE NOT SUBDIVIDED INTO SPECIALTY AREAS. ALL GRADUATES ARE INCLUDED IF THEIR OCCUPATION IS IN THE SAME MAJOR FIELD (EITHER SCIENCE OR ENGINEERING) IN WHICH THEY HOLD THEIR HIGHEST DEGREE.

FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-2. COMPARISON OF MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION: MASTER'S VERSUS BACHELOR'S GRADUATES IN 1979 AND 1980

	PERCENT WITH OCCUPATION SAME AS COLLEGE MAJOR					
	1980 SURVEY		1979 SURVEY			
	1978-79 GRADUATES		1973 GRADUATES		1977 GRADUATES	
MAJOR	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
SCIENCE AND ENGINEERING						
TOTAL	49.5	79.4	37.3	66.8	46.6	72.4
ENERGY-RELATED	75.4	91.3	64.8	86.1	72.3	86.5
ENGINEERING						
TOTAL	87.6	88.6	77.3	82.4	87.7	87.7
ENERGY-RELATED	93.5	93.6	90.4	92.9	95.0	94.7
SCIENCE						
TOTAL	38.2	74.9	25.8	59.2	36.6	64.9
ENERGY-RELATED	51.3	87.0	30.4	74.4	47.2	75.2

NOTE: IN THIS TABLE THE SCIENCE AND ENGINEERING FIELDS ARE NOT SUBDIVIDED INTO SPECIALTY AREAS. ALL GRADUATES ARE INCLUDED IF THEIR OCCUPATION IS IN THE SAME MAJOR FIELD (EITHER SCIENCE OR ENGINEERING) IN WHICH THEY HOLD THEIR HIGHEST DEGREE.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-3 . DETAILED COMPARISON OF MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION: ENERGY-RELATED 1978-79 GRADUATES IN 1980

MAJOR	PERCENT WITH OCCUPATION SAME AS COLLEGE MAJOR	OTHER OCCUPATIONS REPORTED*
ENGINEERS		
CHEMICAL	66.8	MATH AND COMPUTER SCIENCE; MECHANICAL, PETROLEUM, GEOLOGICAL, MINING, AND OTHER ENGINEERING;OTHER
CIVIL	61.9	LIFE AND SOCIAL SCIENCE; ALL ENGINEERING FIELDS;OTHER
ELECTRICAL OR ELECTRONIC	85.7	MATH/COMPUTER SCIENCE; MECHANICAL AND OTHER ENGINEERING; OTHER
MECHANICAL	76.2	PHYSICAL SCIENCE; ALL ENGINEERING FIELDS EXCEPT CIVIL; OTHER
PETROLEUM, GEOLOGICAL, OR MINING	94.3	CIVIL, ELECTRICAL/ELECTRONIC, AND OTHER ENGINEERING
NUCLEAR	71.1	MATH/COMPUTER SCIENCE; CHEMICAL, MECHANICAL, AND OTHER ENGINEERING
METALLURGICAL OR MATERIALS	91.1	OTHER ENGINEERING
OTHER	63.2	MATH/COMPUTER SCIENCE;ALL FIELDS OF ENGINEERING; OTHER
TOTAL, ENGINEERING	74.1	
SCIENTISTS		
PHYSICAL	56.1	MATH/COMPUTER AND EARTH/ENVIRONMENTAL SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL AND NUCLEAR; OTHER
MATH AND COMPUTER	73.5	PHYSICAL AND EARTH/ENVIRONMENTAL SCIENCE; CHEMICAL, MECHANICAL, NUCLEAR, AND OTHER ENGINEERING; OTHER
EARTH AND ENVIRONMENTAL	83.6	MECHANICAL, PETROLEUM/GEOLOGICAL/MINING AND OTHER ENGINEERING; OTHER
LIFE	11.0	EARTH/ENVIRONMENTAL SCIENCE; PETROLEUM/GEOLOGICAL/MINING AND OTHER ENGINEERING; OTHER
SOCIAL	13.4	OTHER
TOTAL, SCIENCE	43.5	
OTHER	61.9	PHYSICAL, MATH/COMPUTER, AND EARTH/ENVIRONMENTAL SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL AND PETROLEUM, GEOLOGICAL, /MINING
TOTAL	61.5	

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* THE NUMBER OF RESPONDENTS WORKING OUTSIDE THEIR MAJOR FIELD IS TOO SMALL TO MAKE RELIABLE STATEMENTS ABOUT THE PROPORTION OF GRADUATES IN EACH FIELD.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-4 . DETAILED COMPARISON OF MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION: ENERGY-RELATED 1977 GRADUATES IN 1979

MAJOR	PERCENT WITH OCCUPATION SAME AS — COLLEGE MAJOR	OTHER OCCUPATIONS REPORTED*
ENGINEERS		
CHEMICAL	77.1	PHYSICAL, MATH/COMPUTER, AND LIFE SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL AND ELECTRICAL
CIVIL	59.2	MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CHEMICAL; OTHER
ELECTRICAL OR ELECTRONIC	83.7	MATH/COMPUTER AND LIFE SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CHEMICAL AND CIVIL
MECHANICAL	75.6	MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL; OTHER
PETROLEUM, GEOLOGICAL, OR MINING	73.8	MATH/COMPUTER AND EARTH/ENVIRONMENTAL SCIENCE; OTHER ENGINEERING
NUCLEAR	63.1	CHEMICAL, MECHANICAL, AND PETROLEUM/GEOLOGICAL/MINING ENGINEERING
METALLURGICAL OR MATERIALS	61.6	PHYSICAL SCIENCE; NUCLEAR AND OTHER ENGINEERING
OTHER ENGINEERING	42.6	PHYSICAL, MATH/COMPUTER, AND EARTH/ENVIRONMENTAL SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CHEMICAL; OTHER
TOTAL, ENGINEERING	68.4	
SCIENTISTS		
PHYSICAL	57.4	MATH/COMPUTER, EARTH/ENVIRONMENTAL, AND LIFE SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL; OTHER
MATH AND COMPUTER	69.6	SOCIAL SCIENCE; OTHER ENGINEERING; OTHER
EARTH AND ENVIRONMENTAL	83.3	PHYSICAL, MATH/COMPUTER SCIENCE; MECHANICAL, NUCLEAR, PETROLEUM/GEOLOGICAL/MINING AND OTHER ENGINEERING; OTHER
LIFE	18.1	PHYSICAL, EARTH/ENVIRONMENTAL, AND SOCIAL SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CHEMICAL AND ELECTRICAL; OTHER
SOCIAL	21.5	ALL FIELDS OF SCIENCE; OTHER ENGINEERING; OTHER
TOTAL, SCIENCE	44.8	
OTHER	75.9	CIVIL AND PETROLEUM/GEOLOGICAL/MINING ENGINEERING
TOTAL	57.7	

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* THE NUMBER OF RESPONDENTS WORKING OUTSIDE THEIR MAJOR FIELD IS TOO SMALL TO MAKE RELIABLE STATEMENTS ABOUT THE PROPORTION OF GRADUATES IN EACH FIELD.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-5 . DETAILED COMPARISON OF MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION: ENERGY-RELATED 1978-79 GRADUATES IN 1980

MAJOR	PERCENT WITH OCCUPATION SAME AS COLLEGE MAJOR	OTHER OCCUPATIONS REPORTED*
ENGINEERS		
CHEMICAL	77.6	MATH/COMPUTER SCIENCE; MECHANICAL, PETROLEUM/GEOLOGICAL/MINING, NUCLEAR, AND OTHER ENGINEERING; OTHER
CIVIL	67.0	MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING; OTHER
ELECTRICAL OR ELECTRONIC	84.4	PHYSICAL AND MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CHEMICAL AND CIVIL
MECHANICAL	67.5	MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING; OTHER
PETROLEUM, GEOLOGICAL, OR MINING	89.3	EARTH/ENVIRONMENTAL AND SOCIAL SCIENCE; ELECTRICAL/ELECTRONIC, AND OTHER ENGINEERING
NUCLEAR	69.5	MATH/COMPUTER SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL AND METALLURGICAL/MATERIALS; OTHER
METALLURGICAL OR MATERIALS	79.8	ELECTRICAL/ELECTRONIC AND OTHER ENGINEERING
OTHER ENGINEERING	59.9	ALL FIELDS EXCEPT METALLURGICAL/MATERIALS ENGINEERING AND LIFE SCIENCE
TOTAL, ENGINEERING	72.4	
SCIENTISTS		
PHYSICAL	64.0	ALL FIELDS OF SCIENCE; ALL FIELDS OF ENGINEERING EXCEPT CIVIL AND METALLURGICAL/MATERIALS; OTHER
MATH AND COMPUTER	70.4	ALL FIELDS OF ENGINEERING EXCEPT CIVIL, ELECTRICAL/ELECTRONIC, AND METALLURGICAL/MATERIALS; OTHER
EARTH AND ENVIRONMENTAL	74.3	ALL FIELDS OF SCIENCE EXCEPT LIFE; MECHANICAL, PETROLEUM/GEOLOGICAL/MINING, NUCLEAR, AND OTHER ENGINEERING; OTHER
LIFE	32.0	ALL FIELDS OF SCIENCE; CIVIL, PETROLEUM/GEOLOGICAL/MINING AND OTHER ENGINEERING; OTHER
SOCIAL	20.3	ALL FIELDS OF SCIENCE EXCEPT PHYSICAL AND LIFE; CIVIL, PETROLEUM/GEOLOGICAL/MINING,AND OTHER ENGINEERING; OTHER
TOTAL, SCIENCE	48.0	
OTHER	30.8	PHYSICAL, MATH/COMPUTER, AND LIFE SCIENCE; ELECTRICAL/ELECTRONIC, PETROLEUM/GEOLOGICAL/MINING, AND OTHER ENGINEERING, OTHER
TOTAL	62.1	

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* THE NUMBER OF RESPONDENTS WORKING OUTSIDE THEIR MAJOR FIELD IS TOO SMALL TO MAKE RELIABLE STATEMENTS ABOUT THE PROPORTION OF GRADUATES IN EACH FIELD.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-6 . EDUCATIONAL ATTAINMENT BY MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

	TOTAL			ENERGY-RELATED		
MAJOR	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	59.7	36.3	4.0	60.2	36.6	3.2
CIVIL	69.2	28.8	1.9	52.7	42.7	4.6
ELECTRICAL OR ELECTRONIC	63.3	35.0	1.7	68.6	30.9	0.5
MECHANICAL	70.1	26.7	3.3	69.9	23.3	6.7
PETROLEUM, GEOLOGICAL, OR MINING	58.8	34.4	6.8	62.9	26.7	10.4
NUCLEAR	20.7	68.7	10.6	30.7	56.7	12.6
METALLURGICAL AND MATERIALS	25.9	40.1	34.0	17.8	41.0	41.2
OTHER ENGINEERING	53.9	42.7	3.4	58.5	33.2	8.3
TOTAL, ENGINEERING	61.0	35.8	3.2	61.7	32.2	6.1
SCIENTISTS						
PHYSICAL	48.3	35.6	16.1	38.2	27.3	34.5
MATH AND COMPUTER	61.9	34.4	3.7	62.1	36.7	1.2
EARTH AND ENVIRONMENTAL	63.7	30.3	6.0	35.5	54.6	9.8
LIFE	68.9	24.0	7.1	90.6	7.8	1.5
SOCIAL	74.2	19.1	6.7	83.0	15.0	2.0
TOTAL, SCIENCE	68.8	24.2	7.0	65.5	26.7	7.8
OTHER	0.0	56.2	43.8	0.0	70.4	29.6
TOTAL	54.1	32.6	13.2	58.9	32.8	8.3

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-7 . EDUCATIONAL ATTAINMENT BY MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

MAJOR	TOTAL BACHELOR'S (PERCENT)	TOTAL MASTER'S (PERCENT)	TOTAL DOCTORATE (PERCENT)	ENERGY-RELATED BACHELOR'S (PERCENT)	ENERGY-RELATED MASTER'S (PERCENT)	ENERGY-RELATED DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	72.2	27.8	0.0	79.5	20.5	0.0
CIVIL	69.8	30.0	0.2	69.7	30.3	0.0
ELECTRICAL OR ELECTRONIC	67.1	31.5	1.3	74.9	25.1	0.0
MECHANICAL	73.8	26.0	0.1	70.2	29.4	0.4
PETROLEUM, GEOLOGICAL, OR MINING	75.6	24.4	0.0	76.2	23.8	0.0
NUCLEAR	51.5	47.2	1.2	53.1	45.2	1.7
METALLURGICAL AND MATERIALS	53.8	43.1	3.0	38.4	61.6	0.0
OTHER ENGINEERING	65.6	33.4	1.0	67.9	26.1	6.0
TOTAL, ENGINEERING	68.3	30.9	0.8	70.9	28.0	1.2
SCIENTISTS						
PHYSICAL	73.1	25.9	1.0	58.7	40.1	1.3
MATH AND COMPUTER	72.6	27.2	0.2	62.7	37.3	0.0
EARTH AND ENVIRONMENTAL	76.0	23.6	0.4	69.8	29.7	0.5
LIFE	84.1	15.6	0.4	79.9	20.1	0.0
SOCIAL	82.9	16.1	1.1	86.4	11.7	1.9
TOTAL, SCIENCE	81.1	18.1	0.7	75.3	23.9	0.9
OTHER	0.0	86.2	13.8	0.0	24.1	75.9
TOTAL	76.8	22.2	1.0	72.4	26.1	1.5

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-8 . EDUCATIONAL ATTAINMENT BY MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

	TOTAL			ENERGY-RELATED		
MAJOR	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	78.5	20.7	0.8	70.4	28.9	0.6
CIVIL	76.3	23.7	0.0	74.4	25.6	0.0
ELECTRICAL OR ELECTRONIC	74.3	25.5	0.1	75.3	24.7	0.0
MECHANICAL	81.6	18.2	0.1	80.1	19.7	0.2
PETROLEUM, GEOLOGICAL, OR MINING	79.1	20.5	0.4	82.2	17.4	0.5
NUCLEAR	45.9	54.1	0.0	46.2	53.8	0.0
METALLURGICAL AND MATERIALS	43.8	56.2	0.0	57.8	42.2	0.0
OTHER ENGINEERING	72.8	26.8	0.5	72.0	28.0	0.0
TOTAL, ENGINEERING	75.1	24.6	0.3	74.3	25.5	0.2
SCIENTISTS						
PHYSICAL	77.4	21.8	0.8	77.9	19.9	2.2
MATH AND COMPUTER	72.6	26.8	0.6	79.8	18.4	1.8
EARTH AND ENVIRONMENTAL	74.3	25.6	0.1	62.5	37.3	0.3
LIFE	83.9	15.7	0.4	88.1	11.9	0.0
SOCIAL	86.5	13.0	0.5	90.8	9.2	0.0
TOTAL, SCIENCE	83.0	16.5	0.5	79.9	19.5	0.6
OTHER	0.0	94.2	5.8	0.0	92.8	7.2
TOTAL	80.0	19.5	0.5	76.0	23.6	0.4

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-9 . EDUCATIONAL ATTAINMENT BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

OCCUPATION	TOTAL			ENERGY-RELATED		
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	56.6	37.3	6.1	40.4	52.2	7.5
CIVIL	65.9	32.3	1.8	48.7	44.4	6.9
ELECTRICAL OR ELECTRONIC	58.5	40.2	1.3	62.2	36.9	0.9
MECHANICAL	62.2	33.0	4.8	60.3	28.1	11.6
PETROLEUM, GEOLOGICAL, OR MINING	67.8	28.4	3.9	70.0	25.1	4.9
NUCLEAR	41.3	50.7	8.1	46.1	40.8	13.1
METALLURGICAL AND MATERIALS	34.5	34.8	30.6	44.4	24.2	31.4
OTHER ENGINEERING	54.4	42.4	3.2	65.5	32.3	2.2
TOTAL, ENGINEERING	58.4	38.3	3.3	59.5	34.4	6.2
SCIENTISTS						
PHYSICAL	38.3	37.8	23.9	19.8	25.6	54.7
MATH AND COMPUTER	53.7	40.5	5.8	63.9	33.1	2.9
EARTH AND ENVIRONMENTAL	30.7	56.1	13.2	25.8	64.7	9.5
LIFE	57.1	28.3	14.6	68.0	21.3	10.7
SOCIAL	26.5	48.6	24.9	39.1	46.5	14.4
TOTAL, SCIENCE	44.2	40.0	15.8	42.7	41.4	16.0
OTHER	57.2	27.3	15.4	71.2	21.9	7.0
TOTAL	54.1	32.7	13.3	58.9	32.8	8.3

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-10 . EDUCATIONAL ATTAINMENT BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

OCCUPATION	TOTAL			ENERGY-RELATED		
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	75.0	24.2	0.8	74.6	24.3	1.1
CIVIL	68.5	31.2	0.2	65.9	34.1	0.0
ELECTRICAL OR ELECTRONIC	66.8	32.4	0.8	78.3	21.7	0.0
MECHANICAL	77.7	22.3	0.0	72.1	27.9	0.0
PETROLEUM, GEOLOGICAL, OR MINING	78.7	21.3	0.0	75.9	24.1	0.0
NUCLEAR	66.4	32.6	1.0	55.6	43.0	1.4
METALLURGICAL AND MATERIALS	64.5	35.5	0.0	16.8	83.2	0.0
OTHER ENGINEERING	67.1	32.1	0.9	63.9	30.8	5.4
TOTAL, ENGINEERING	70.1	29.3	0.5	70.6	28.3	1.1
SCIENTISTS						
PHYSICAL	73.5	24.4	2.1	61.5	37.1	1.4
MATH AND COMPUTER	71.0	28.8	0.2	65.7	34.3	0.0
EARTH AND ENVIRONMENTAL	66.3	31.4	2.2	70.5	29.0	0.5
LIFE	77.5	21.6	0.8	50.8	49.2	0.0
SOCIAL	55.4	40.4	4.3	66.4	25.6	7.9
TOTAL, SCIENCE	69.4	28.9	1.7	65.8	32.7	1.5
OTHER	86.0	13.4	0.6	89.2	7.7	3.1
TOTAL	76.8	22.3	1.0	72.4	26.1	1.5

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-11 . EDUCATIONAL ATTAINMENT BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

	TOTAL			ENERGY-RELATED		
OCCUPATION	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	DOCTORATE (PERCENT)
ENGINEERS						
CHEMICAL	78.1	21.0	0.9	71.9	27.4	0.7
CIVIL	76.0	24.0	0.0	75.9	24.1	0.0
ELECTRICAL OR ELECTRONIC	71.9	27.8	0.3	69.2	30.8	0.0
MECHANICAL	79.5	20.3	0.2	77.3	22.4	0.3
PETROLEUM, GEOLOGICAL, OR MINING	83.2	16.5	0.2	84.4	15.3	0.3
NUCLEAR	65.7	34.3	0.0	64.6	35.4	0.0
METALLURGICAL AND MATERIALS	57.7	42.3	0.0	55.1	44.9	0.0
OTHER ENGINEERING	75.2	24.3	0.5	76.5	22.9	0.7
TOTAL, ENGINEERING	75.4	24.3	0.3	75.3	24.4	0.3
SCIENTISTS						
PHYSICAL	75.9	23.6	0.5	78.8	20.3	0.9
MATH AND COMPUTER	73.6	25.7	0.7	72.1	26.5	1.4
EARTH AND ENVIRONMENTAL	64.5	35.3	0.1	58.4	41.3	0.3
LIFE	75.3	24.0	0.7	70.8	29.2	0.0
SOCIAL	58.3	39.7	2.0	73.6	26.4	0.0
TOTAL, SCIENCE	70.5	28.6	0.9	68.9	30.5	0.6
OTHER	90.6	9.2	0.2	92.0	7.6	0.4
TOTAL	79.9	19.6	0.5	76.0	23.6	0.4

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-12. PERCENT NONWHITE: TOTAL VERSUS ENERGY-RELATED GRADUATES IN 1980 AND 1979

	TOTAL			ENERGY-RELATED		
	1980 SURVEY	1979 SURVEY		1980 SURVEY	1979 SURVEY	
MAJOR	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)
SCIENCE AND ENGINEERING	6.3	6.0	6.2	7.3	3.5	5.4
ENGINEERING	7.0	5.2	5.4	8.6	3.4	5.9
SCIENCE	6.1	6.2	6.4	5.6	3.6	4.8
OCCUPATION						
SCIENCE AND ENGINEERING	6.2	5.6	5.5	7.7	4.0	4.8
ENGINEERING	7.1	4.8	5.4	9.4	4.2	5.3
SCIENCE	5.6	6.2	5.5	3.8	3.4	3.7

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-13. PERCENT FEMALE: TOTAL VERSUS ENERGY-RELATED GRADUATES IN 1980 AND 1979

	TOTAL			ENERGY-RELATED		
	1980 SURVEY	1979 SURVEY		1980 SURVEY	1979 SURVEY	
MAJOR	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)
SCIENCE AND ENGINEERING	31.7	22.0	30.0	13.7	7.9	13.6
ENGINEERING	7.0	1.0	4.7	6.4	1.2	4.3
SCIENCE	39.8	28.9	37.3	24.0	17.4	24.5
OCCUPATION						
SCIENCE AND ENGINEERING	24.0	14.3	22.9	13.4	7.1	11.3
ENGINEERING	8.7	2.5	7.3	7.5	3.5	5.1
SCIENCE	34.7	22.9	33.3	27.0	17.5	24.5

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-14 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED
	(PERCENT)		(PERCENT)		(PERCENT)	
BUSINESS OR INDUSTRY	57.6	84.4	78.7	91.1	42.1	65.6
EDUCATIONAL INSTITUTION	15.4	6.3	3.3	3.3	24.3	14.7
FEDERAL GOVERNMENT	9.3	6.4	8.0	3.6	10.3	14.3
STATE OR LOCAL GOVERNMENT	9.6	2.4	6.2	1.6	12.1	4.5
NONPROFIT ORGANIZATION	2.5	0.3	1.0	0.1	3.6	0.9
OTHER	5.6	0.2	2.8	0.3	7.6	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-15 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED
	(PERCENT)		(PERCENT)		(PERCENT)	
BUSINESS OR INDUSTRY	53.9	77.2	77.6	85.3	38.1	60.0
EDUCATIONAL INSTITUTION	20.7	9.2	7.5	5.8	29.6	16.5
FEDERAL GOVERNMENT	7.9	6.9	6.7	4.4	8.7	12.3
STATE OR LOCAL GOVERNMENT	8.4	2.3	4.3	1.2	11.1	4.5
NONPROFIT ORGANIZATION	2.8	2.0	0.8	0.8	4.1	4.6
OTHER	6.3	2.4	3.2	2.5	8.4	2.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-16 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED
	(PERCENT)		(PERCENT)		(PERCENT)	
BUSINESS OR INDUSTRY	57.7	79.5	80.6	84.5	41.6	67.7
EDUCATIONAL INSTITUTION	20.1	10.5	7.0	8.2	29.2	15.9
FEDERAL GOVERNMENT	7.4	5.7	5.3	3.7	8.8	10.5
STATE OR LOCAL GOVERNMENT	6.3	1.9	3.5	1.0	8.3	4.0
NONPROFIT ORGANIZATION	3.0	1.6	0.8	1.6	4.6	1.6
OTHER	5.5	0.9	2.8	1.1	7.5	0.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-17 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES AND BACHELOR'S VERSUS MASTER'S, 1973 GRADUATES IN 1979

	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
TYPE OF EMPLOYER	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
			TOTAL			
PRIVATE INDUSTRY	68.4	53.1	82.1	75.6	55.1	37.4
EDUCATIONAL INSTITUTION	5.0	18.4	*	4.3	9.0	28.3
FEDERAL GOVERNMENT	9.0	9.8	7.4	9.1	10.5	10.3
STATE AND LOCAL GOVERNMENT	11.7	8.9	7.0	5.4	16.2	11.3
OTHER	5.9	9.8	2.6	5.6	9.1	12.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
			ENERGY-RELATED			
PRIVATE INDUSTRY	90.3	83.2	94.3	89.8	74.2	67.4
EDUCATIONAL INSTITUTION	**	6.5	**	*	8.3	**
GOVERNMENT +	7.5	9.2	5.0	5.1	17.5	19.3
OTHER	**	**	**	0.6	0.0	**
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

** INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

+ SAMPLE SIZE FOR ENERGY-RELATED GRADUATES IS TOO SMALL TO SUBDIVIDE THIS CATEGORY.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-18 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES AND BACHELOR'S VERSUS MASTER'S, 1977 GRADUATES IN 1979

TOTAL

	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
TYPE OF EMPLOYER	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
PRIVATE INDUSTRY	59.5	42.2	82.2	67.6	44.0	24.8
EDUCATIONAL INSTITUTION	16.3	30.1	5.2	11.9	23.9	42.5
FEDERAL GOVERNMENT	7.4	9.0	5.8	8.8	8.4	9.1
STATE AND LOCAL GOVERNMENT	8.6	7.9	3.8	5.4	11.8	9.6
OTHER	8.3	10.9	3.0	6.2	11.9	14.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
			ENERGY-RELATED			
PRIVATE INDUSTRY	83.9	63.8	92.3	71.2	64.7	50.3
EDUCATIONAL INSTITUTION	6.3	14.0	3.0	9.1	13.7	23.1
GOVERNMENT +	6.8	14.7	2.9	12.6	*	18.6
OTHER	3.1	7.4	**	7.2	6.1	**
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

** INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

+ SAMPLE SIZE FOR ENERGY-RELATED GRADUATES IS TOO SMALL TO SUBDIVIDE THIS CATEGORY.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-19 . TYPE OF EMPLOYER BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES AND BACHELOR'S VERSUS MASTER'S, 1978-79 GRADUATES IN 1980

	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
TYPE OF EMPLOYER	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
TOTAL						
PRIVATE INDUSTRY	62.3	46.1	83.6	71.4	46.3	31.0
EDUCATIONAL INSTITUTION	16.1	29.7	5.2	12.5	24.2	40.0
FEDERAL GOVERNMENT	6.9	8.9	4.4	8.0	8.7	9.4
STATE AND LOCAL GOVERNMENT	6.3	6.7	3.4	3.9	8.4	8.3
OTHER	8.5	8.7	3.3	4.3	12.4	11.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0
ENERGY-RELATED						
PRIVATE INDUSTRY	80.8	76.2	85.9	80.8	67.7	67.7
EDUCATIONAL INSTITUTION	9.4	13.2	7.5	10.2	14.5	18.8
FEDERAL GOVERNMENT	5.6	5.9	2.9	5.8	12.5	6.0
STATE AND LOCAL GOVERNMENT	1.6	2.6	0.8	1.7	3.8	4.4
OTHER	2.6	2.1	3.0	**	1.5	**
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

** INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

+ SAMPLE SIZE FOR ENERGY-RELATED GRADUATES IS TOO SMALL TO SUBDIVIDE THIS CATEGORY.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-20 . PRIMARY WORK ACTIVITY BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED	TOTAL	ENERGY-RELATED
	(PERCENT)		(PERCENT)		(PERCENT)	
MANAGEMENT	17.2	15.2	19.6	16.4	15.4	11.9
TEACHING	8.8	3.5	2.9	3.9	13.2	*
BASIC RESEARCH	7.1	5.4	2.0	2.1	10.8	14.7
APPLIED RESEARCH	6.8	9.2	5.6	7.7	7.6	13.7
DEVELOPMENT	10.1	10.6	16.0	12.7	5.8	4.8
REPORT, TECHNICAL WRITING	5.8	5.4	5.9	4.5	5.7	7.8
DESIGN	7.2	14.1	15.7	17.3	1.0	*
QUALITY CONTROL	4.5	2.8	5.1	3.3	4.1	*
OPERATIONS	10.3	15.8	15.7	19.5	6.4	*
DISTRIBUTION	2.2	2.1	3.2	2.8	1.4	0.0
CONSULTING	4.1	5.4	4.8	5.1	3.5	6.1
COMPUTER APPLICATIONS	9.6	7.6	2.1	2.5	15.0	22.2
OTHER	6.3	2.8	1.5	2.2	9.9	18.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-21 . PRIMARY WORK ACTIVITY BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

ACTIVITY	ALL SCIENTISTS AND ENGINEERS TOTAL (PERCENT)	ALL SCIENTISTS AND ENGINEERS ENERGY-RELATED (PERCENT)	ENGINEERS TOTAL (PERCENT)	ENGINEERS ENERGY-RELATED (PERCENT)	SCIENTISTS TOTAL (PERCENT)	SCIENTISTS ENERGY-RELATED (PERCENT)
MANAGEMENT	9.7	9.4	9.9	9.8	9.5	8.6
TEACHING	10.0	3.8	3.6	2.0	14.3	7.7
BASIC RESEARCH	10.2	6.4	4.0	4.0	14.4	11.6
APPLIED RESEARCH	7.2	9.2	4.7	6.0	8.9	16.1
DEVELOPMENT	11.2	11.3	17.4	12.2	7.0	9.2
REPORT, TECHNICAL WRITING	6.0	7.0	5.5	4.1	6.3	13.4
DESIGN	7.3	11.7	17.1	16.3	0.8	*
QUALITY CONTROL	7.4	7.2	9.6	7.6	6.0	6.3
OPERATIONS	10.3	17.8	16.2	23.4	6.4	5.9
DISTRIBUTION	2.5	4.0	2.9	5.4	2.2	*
CONSULTING	2.6	3.6	2.9	4.0	2.4	*
COMPUTER APPLICATIONS	9.9	5.7	4.4	3.3	13.6	10.8
OTHER	5.6	2.9	1.8	1.9	8.2	10.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-22 . PRIMARY WORK ACTIVITY BY OCCUPATION: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
MANAGEMENT	8.5	11.0	9.8	11.1	7.6	10.8
TEACHING	10.2	2.1	2.3	1.3	15.7	3.9
BASIC RESEARCH	10.0	7.4	3.4	5.5	14.7	11.9
APPLIED RESEARCH	7.3	10.8	5.6	7.5	8.5	18.6
DEVELOPMENT	10.4	11.8	17.1	12.2	5.6	10.7
REPORT, TECHNICAL WRITING	5.5	6.0	5.9	6.4	5.2	5.2
DESIGN	10.4	15.4	23.1	21.2	1.5	1.9
QUALITY CONTROL	6.7	6.4	7.8	5.7	6.0	8.2
OPERATIONS	9.5	15.0	13.8	19.1	6.6	5.4
DISTRIBUTION	2.2	2.3	1.7	2.2	2.5	2.5
CONSULTING	2.7	3.3	3.1	3.4	2.5	3.0
COMPUTER APPLICATIONS	10.9	5.9	4.1	2.4	15.7	14.0
OTHER	5.7	2.6	2.4	1.9	8.0	4.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-23 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ALL 1973 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1979

	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
WORK ACTIVITY	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	18.2	18.2	16.6	25.6	19.8	12.9
TEACHING	4.4	10.3	1.9	2.5	6.8	15.8
BASIC RESEARCH	4.0	6.3	*	1.5	6.2	9.7
APPLIED RESEARCH	5.4	6.9	4.5	5.5	6.2	7.9
DEVELOPMENT	10.4	10.9	13.6	19.9	7.3	4.6
REPORT, TECHNICAL WRITING	6.1	5.8	6.0	6.0	6.2	5.7
DESIGN	9.1	6.3	16.8	14.6	*	+
QUALITY CONTROL	5.7	3.9	6.3	3.6	5.0	4.1
OPERATIONS	15.5	6.3	20.3	9.8	10.8	3.9
DISTRIBUTION	3.4	1.2	4.6	1.4	2.2	+
CONSULTING	3.3	6.0	4.7	5.2	1.9	6.6
COMPUTER APPLICATIONS	10.2	10.7	1.7	2.6	18.5	16.4
OTHER	4.4	7.1	2.9	1.8	9.2	10.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-24 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ALL 1977 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1979

WORK ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	8.6	12.4	8.0	14.7	9.1	10.8
TEACHING	8.3	13.8	3.8	3.1	11.3	21.1
BASIC RESEARCH	9.7	10.9	3.5	5.2	14.0	14.8
APPLIED RESEARCH	5.9	10.0	2.5	9.1	8.2	10.7
DEVELOPMENT	11.8	10.1	17.8	16.7	7.7	5.5
REPORT, TECHNICAL WRITING	6.2	5.5	5.7	5.1	6.6	5.7
DESIGN	7.6	6.9	17.6	16.0	0.8	+
QUALITY CONTROL	8.5	4.9	10.9	6.6	6.9	3.8
OPERATIONS	12.9	4.6	19.2	9.1	8.6	1.6
DISTRIBUTION	3.4	*	3.9	*	3.0	+
CONSULTING	2.0	4.1	2.1	4.9	2.0	3.6
COMPUTER APPLICATIONS	10.1	9.9	3.3	7.2	14.8	11.7
OTHER	5.0	6.4	1.8	2.4	7.1	9.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-25 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ALL 1978-79 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1980

WORK ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	7.7	10.8	8.9	12.7	6.8	9.7
TEACHING	8.8	13.6	1.9	3.6	13.9	19.5
BASIC RESEARCH	9.2	11.6	2.9	4.9	13.9	15.6
APPLIED RESEARCH	6.2	10.3	4.9	7.5	7.1	11.9
DEVELOPMENT	10.3	10.6	16.6	19.0	5.7	5.7
REPORT, TECHNICAL WRITING	5.1	6.5	5.7	6.4	4.7	6.6
DESIGN	11.2	8.3	24.1	19.8	1.5	1.4
QUALITY CONTROL	7.7	4.2	8.5	5.8	7.2	3.3
OPERATIONS	11.7	4.0	16.3	6.3	8.2	2.6
DISTRIBUTION	2.7	0.7	2.0	0.9	3.3	0.6
CONSULTING	2.2	4.1	2.1	6.0	2.3	3.0
COMPUTER APPLICATIONS	11.7	8.9	3.4	6.2	18.0	10.5
OTHER	5.5	6.3	2.8	1.0	7.5	9.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-26 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ENERGY-RELATED 1973 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1979

WORK ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	13.0	20.6	13.3	24.3	+	+
RESEARCH	7.0	14.0	5.3	8.5	+	27.2
DESIGN OR DEVELOPMENT	26.0	25.5	28.2	35.3	+	+
OPERATIONS	19.9	13.5	24.2	14.9	+	+
OTHER	34.1	26.3	29.0	17.1	54.4	48.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-27 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ENERGY-RELATED 1977 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1979

WORK ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	8.2	12.7	7.7	15.6	+	+
RESEARCH	11.0	23.9	5.7	17.4	23.1	35.8
DESIGN OR DEVELOPMENT	22.7	24.1	28.3	30.4	+	12.5
OPERATIONS	22.0	8.9	28.5	11.6	+	+
OTHER	36.0	30.5	29.8	25.0	50.4	40.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-28 . PRIMARY WORK ACTIVITY INVOLVED IN THE OCCUPATIONS OF ENERGY-RELATED 1978-79 GRADUATES: BACHELOR'S VERSUS MASTER'S IN 1980

WORK ACTIVITY	ALL SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)	BACHELOR'S (PERCENT)	MASTER'S (PERCENT)
MANAGEMENT	10.4	12.4	10.6	12.0	10.0	13.0
RESEARCH	17.0	21.5	12.2	15.5	29.3	32.7
DESIGN OR DEVELOPMENT	25.8	30.9	31.3	40.0	11.8	13.9
OPERATIONS	18.1	6.5	22.8	8.0	6.2	3.8
OTHER	28.6	28.7	23.1	24.4	42.7	36.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-29 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: TOTAL 1973 GRADUATES IN 1979 *

	EMPLOYMENT STATUS							
	FULL-TIME, SCIENCE OR ENGINEERING		FULL-TIME, NONSCIENCE, NONENGINEERING		PART-TIME		TOTAL **	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	3,580	89.2	370	9.1	+	+	4,020	100.0
CIVIL	8,800	90.2	930	9.5	+	+	9,750	100.0
ELECTRICAL OR ELECTRONIC	15,050	91.3	1,280	7.7	+	+	16,500	100.0
MECHANICAL	8,800	86.0	1,340	13.0	+	+	10,240	100.0
NUCLEAR, PETROLEUM, OR MINING	2,480	92.1	+	+	+	+	2,690	100.0
OTHER ENGINEERING	15,590	73.1	5,300	24.9	+	+	21,310	100.0
TOTAL, ENGINEERING	54,300	84.2	9,350	14.5	850	1.3	64,500	100.0
SCIENTISTS								
PHYSICAL	9,150	65.9	3,070	22.1	1,410	10.1	13,890	100.0
MATH AND COMPUTER	17,350	59.3	10,500	35.9	1,360	4.6	29,260	100.0
EARTH AND ENVIRONMENTAL	4,980	51.8	3,950	41.1	610	6.4	9,600	100.0
LIFE	19,730	41.2	21,630	45.1	5,310	11.1	47,930	100.0
SOCIAL	20,750	21.2	66,450	68.0	10,530	10.8	97,770	100.0
TOTAL, SCIENCE	71,960	36.3	105,600	53.2	19,220	9.7	198,450	100.0
OTHER	5,490	8.9	48,290	78.0	2,980	4.8	61,880	100.0
TOTAL	131,750	40.6	163,240	50.3	23,050	7.1	324,840	100.0

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* INCLUDES ONLY EMPLOYED GRADUATES.

** INCLUDES POSTDOCTORAL EMPLOYMENT NOT SHOWN SEPARATELY.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-30 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: TOTAL 1977 GRADUATES IN 1979 *

	EMPLOYMENT STATUS							
	FULL-TIME, SCIENCE OR ENGINEERING		FULL-TIME, NONSCIENCE, NONENGINEERING		PART-TIME		TOTAL **	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	3,830	89.1	180	4.2	290	6.7	4,300	100.0
CIVIL	9,890	90.0	640	5.9	460	4.1	10,990	100.0
ELECTRICAL OR ELECTRONIC	13,400	91.0	620	4.2	690	4.7	14,730	100.0
MECHANICAL	9,720	92.2	480	4.5	330	3.1	10,550	100.0
NUCLEAR, PETROLEUM, OR MINING	2,960	89.0	150	4.4	220	6.6	3,330	100.0
OTHER ENGINEERING	17,330	88.0	1,310	6.7	1,030	5.2	19,690	100.0
TOTAL, ENGINEERING	57,130	89.8	3,380	5.3	3,020	4.7	63,590	100.0
SCIENTISTS								
PHYSICAL	7,950	58.6	2,130	15.7	3,480	25.7	13,560	100.0
MATH AND COMPUTER	15,310	61.9	6,970	28.2	2,430	9.8	24,740	100.0
EARTH AND ENVIRONMENTAL	5,810	55.7	3,250	31.2	1,370	13.1	10,430	100.0
LIFE	29,130	45.3	22,580	35.1	12,470	19.4	64,280	100.0
SOCIAL	21,160	19.7	66,420	61.9	19,610	18.3	107,300	100.0
TOTAL, SCIENCE	79,360	36.0	101,350	46.0	39,360	17.9	220,310	100.0
OTHER	580	10.6	3,660	67.1	1,210	22.3	5,450	100.0
TOTAL	137,070	47.4	108,390	37.5	43,590	15.1	289,350	100.0

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* INCLUDES ONLY EMPLOYED GRADUATES.

** INCLUDES POSTDOCTORAL EMPLOYMENT NOT SHOWN SEPARATELY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-31 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: TOTAL 1978-79 GRADUATES IN 1980 *

	EMPLOYMENT STATUS							
	FULL-TIME, SCIENCE OR ENGINEERING		FULL-TIME, NONSCIENCE, NONENGINEERING		PART-TIME		TOTAL **	
MAJOR	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
ENGINEERS								
CHEMICAL	10,270	88.5	+	+	790	6.8	11,600	100.0
CIVIL	22,800	89.9	+	+	1,270	5.0	25,350	100.0
ELECTRICAL OR ELECTRONIC	30,420	89.5	+	+	2,390	7.0	33,970	100.0
MECHANICAL	20,910	90.5	+	+	1,010	4.4	23,110	100.0
NUCLEAR, PETROLEUM, OR MINING	7,400	91.2	+	+	660	8.2	8,110	100.0
OTHER ENGINEERING	35,570	84.4	4,770	11.3	+	+	42,130	100.0
TOTAL, ENGINEERING	127,370	88.3	8,990	6.21	7,910	5.5	144,270	100.0
SCIENTISTS								
PHYSICAL	18,630	63.9	+	+	6,330	21.7	29,160	100.0
MATH AND COMPUTER	34,280	71.3	+	+	+	+	48,040	100.0
EARTH AND ENVIRONMENTAL	11,800	54.0	5,970	27.3	3,900	17.9	21,840	100.0
LIFE	57,730	44.7	43,060	33.3	28,140	21.8	129,150	100.0
SOCIAL	41,580	19.9	132,600	63.4	33,870	16.2	209,070	100.0
TOTAL, SCIENCE	164,020	37.5	195,100	44.6	76,500	17.5	437,260	100.0
OTHER	1,820	23.0	+	+	+	+	7,940	100.0
TOTAL	293,210	49.7	207,770	35.2	86,790	14.7	589,470	100.0

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* INCLUDES ONLY EMPLOYED GRADUATES.

** INCLUDES POSTDOCTORAL EMPLOYMENT NOT SHOWN SEPARATELY.

+ INCLUDED IN TOTALS BUT NOT SHOWN SEPARATELY DUE TO SMALL SAMPLE SIZE.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-32 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: ENERGY-RELATED 1973 GRADUATES IN 1979*

MAJOR	PERCENT OF GRADUATES EMPLOYED FULL-TIME IN SCIENCE OR ENGINEERING**
ENGINEERS	
CHEMICAL	89.0
CIVIL	92.0
ELECTRICAL OR ELECTRONIC	95.1
MECHANICAL	89.8
NUCLEAR, PETROLEUM, OR MINING	97.9
OTHER ENGINEERING	92.4
TOTAL, ENGINEERING	92.6
SCIENTISTS	
PHYSICAL	73.0
MATH AND COMPUTER	87.3
EARTH AND ENVIRONMENTAL	87.4
LIFE	40.5
SOCIAL	11.3
TOTAL, SCIENCE	52.1
OTHER	38.1
TOTAL	73.3

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* INCLUDES ONLY EMPLOYED GRADUATES.

** NUMBER OF RESPONDENTS IN OTHER EMPLOYMENT CATEGORIES IS TOO SMALL TO SHOW BY INDIVIDUAL FIELD.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-33 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: ENERGY-RELATED 1977 GRADUATES IN 1979*

MAJOR	PERCENT OF GRADUATES EMPLOYED FULL-TIME IN SCIENCE OR ENGINEERING**
ENGINEERS	
CHEMICAL	91.8
CIVIL	91.9
ELECTRICAL OR ELECTRONIC	97.5
MECHANICAL	93.8
NUCLEAR, PETROLEUM, OR MINING	93.9
OTHER ENGINEERING	98.0
TOTAL, ENGINEERING	94.6
SCIENTISTS	
PHYSICAL	68.6
MATH AND COMPUTER	80.4
EARTH AND ENVIRONMENTAL	90.7
LIFE	57.4
SOCIAL	29.9
TOTAL, SCIENCE	60.2
OTHER	+
TOTAL	78.4

---

* INCLUDES ONLY EMPLOYED GRADUATES.

** NUMBER OF RESPONDENTS IN OTHER EMPLOYMENT CATEGORIES IS TOO SMALL TO SHOW BY INDIVIDUAL FIELD.

+ INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-34 . MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD VERSUS EMPLOYMENT STATUS: ENERGY-RELATED 1978-79 GRADUATES IN 1980*

MAJOR	PERCENT OF GRADUATES EMPLOYED FULL-TIME IN SCIENCE OR ENGINEERING**
ENGINEERS	
CHEMICAL	90.9
CIVIL	95.4
ELECTRICAL OR ELECTRONIC	90.5
MECHANICAL	91.7
NUCLEAR, PETROLEUM, OR MINING	93.2
OTHER ENGINEERING	83.1
TOTAL, ENGINEERING	90.8
SCIENTISTS	
PHYSICAL	77.3
MATH AND COMPUTER	74.7
EARTH AND ENVIRONMENTAL	85.3
LIFE	62.7
SOCIAL	26.8
TOTAL, SCIENCE	61.6
OTHER	60.6
TOTAL	84.9

---

* INCLUDES ONLY EMPLOYED GRADUATES.

** NUMBER OF RESPONDENTS IN OTHER EMPLOYMENT CATEGORIES IS TOO SMALL TO SHOW BY INDIVIDUAL FIELD.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-35 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979

FIELD	OCCUPATION			MAJOR		
	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	24,700	25,000	1.01	24,800	24,700	1.00
CIVIL	21,000	25,000	1.19	22,000	25,000	1.14
ELECTRICAL OR ELECTRONIC	23,000	23,000	1.00	23,500	23,000	0.98
MECHANICAL	24,000	25,000	1.04	24,000	25,000	1.04
PETROLEUM, GEOLOGICAL, OR MINING	25,800	26,400	1.02	25,200	30,000	1.19
NUCLEAR	23,600	23,000	0.97	23,000	22,500	0.98
METALLURGICAL AND MATERIALS	24,000	22,500	0.94	24,000	24,000	1.00
OTHER ENGINEERING	23,000	25,000	1.09	23,000	25,000	1.09
TOTAL, ENGINEERING	23,000	25,000	1.09	23,400	25,000	1.07
SCIENTISTS						
PHYSICAL	18,000	20,000	1.11	19,200	20,000	1.04
MATH AND COMPUTER	20,700	21,400	1.03	19,300	21,000	1.09
EARTH AND ENVIRONMENTAL	18,700	21,400	1.14	17,000	21,000	1.24
LIFE	15,000	16,700	1.11	15,000	15,000	1.00
SOCIAL	17,000	23,500	1.38	15,000	20,500	1.37
TOTAL, SCIENCE	17,900	21,400	1.20	16,000	20,000	1.25
OTHER	15,500	20,000	1.29	16,500	21,500	1.30
TOTAL	17,800	23,000	1.29	17,800	23,000	1.29

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-36 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979

FIELD	OCCUPATION			MAJOR		
	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	20,000	20,000	1.00	20,000	20,000	1.00
CIVIL	17,000	19,400	1.14	18,000	19,800	1.10
ELECTRICAL OR ELECTRONIC	19,800	19,000	0.96	20,000	19,000	0.95
MECHANICAL	19,000	19,200	1.01	20,000	19,500	0.97
PETROLEUM, GEOLOGICAL, OR MINING	21,300	22,000	1.03	21,500	22,000	1.02
NUCLEAR	17,800	18,000	1.01	19,200	19,500	1.02
METALLURGICAL AND MATERIALS	18,500	21,600	1.17	19,000	19,500	1.03
OTHER ENGINEERING	18,300	19,100	1.04	18,200	19,000	1.04
TOTAL, ENGINEERING	19,000	19,500	1.03	19,000	20,000	1.05
SCIENTISTS						
PHYSICAL	13,000	14,500	1.12	12,100	14,500	1.20
MATH AND COMPUTER	17,000	18,500	1.09	16,000	16,200	1.01
EARTH AND ENVIRONMENTAL	14,500	18,500	1.28	13,000	18,500	1.42
LIFE	10,500	13,500	1.29	11,000	15,000	1.36
SOCIAL	10,000	12,000	1.20	11,500	13,500	1.17
TOTAL, SCIENCE	12,000	16,200	1.35	12,000	15,500	1.29
OTHER	11,800	15,000	1.27	12,000	*	*
TOTAL	13,000	18,200	1.40	13,000	18,200	1.40

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* INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-37 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980

FIELD	OCCUPATION TOTAL (DOLLARS)	OCCUPATION ENERGY-RELATED (DOLLARS)	OCCUPATION RATIO OF ENERGY-RELATED TO TOTAL	MAJOR TOTAL (DOLLARS)	MAJOR ENERGY-RELATED (DOLLARS)	MAJOR RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	22,700	22,800	1.00	22,500	22,800	1.01
CIVIL	19,500	20,800	1.07	19,700	21,100	1.07
ELECTRICAL OR ELECTRONIC	21,600	21,800	1.01	21,700	22,000	1.01
MECHANICAL	21,000	21,000	1.00	21,500	21,500	1.00
PETROLEUM, GEOLOGICAL, OR MINING	24,000	24,000	1.00	24,800	25,000	1.01
NUCLEAR	21,500	22,000	1.02	22,000	23,000	1.05
METALLURGICAL AND MATERIALS	22,000	20,000	0.91	22,000	16,500	0.75
OTHER ENGINEERING	20,000	21,000	1.05	20,500	22,000	1.07
TOTAL, ENGINEERING	21,000	22,000	1.05	21,000	22,000	1.05
SCIENTISTS						
PHYSICAL	14,000	17,300	1.24	14,700	17,500	1.19
MATH AND COMPUTER	18,400	20,000	1.09	18,000	18,700	1.04
EARTH AND ENVIRONMENTAL	15,100	21,000	1.39	14,000	21,000	1.50
LIFE	11,500	12,000	1.04	12,000	16,000	1.33
SOCIAL	11,500	16,800	1.46	12,000	17,000	1.42
TOTAL, SCIENCE	13,300	18,000	1.35	12,500	17,800	1.42
OTHER	12,000	18,000	1.50	12,500	15,500	1.24
TOTAL	15,000	20,700	1.38	15,000	20,700	1.38

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-38 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979, BACHELOR'S

FIELD	OCCUPATION			MAJOR		
	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	24,000	24,900	1.04	24,200	24,200	1.00
CIVIL	20,000	24,000	1.20	21,000	24,000	1.14
ELECTRICAL OR ELECTRONIC	22,000	22,500	1.02	22,500	22,500	1.00
MECHANICAL	22,700	25,000	1.10	24,000	25,000	1.04
PETROLEUM, GEOLOGICAL, OR MINING	24,000	25,000	1.04	27,700	30,000	1.08
NUCLEAR	21,600	21,700	1.00	21,700	21,800	1.00
METALLURGICAL AND MATERIALS	21,000	20,600	0.98	23,000	23,000	1.00
OTHER ENGINEERING	21,500	24,000	1.12	20,600	24,000	1.17
TOTAL, ENGINEERING	22,000	24,000	1.09	22,000	24,100	1.10
SCIENTISTS						
PHYSICAL	17,900	16,000	0.89	18,300	20,000	1.09
MATH AND COMPUTER	20,000	21,400	1.07	18,000	21,400	1.19
EARTH AND ENVIRONMENTAL	15,000	21,400	1.43	15,000	19,200	1.28
LIFE	15,000	*	*	15,000	15,000	1.00
SOCIAL	15,000	*	*	15,000	20,000	1.33
TOTAL, SCIENCE	17,000	21,000	1.24	15,000	20,000	1.33
OTHER	15,000	20,000	1.33	**	**	**
TOTAL	17,000	22,000	1.29	17,000	22,000	1.29

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* INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

** SINCE THE SAMPLE WAS SELECTED FROM GRADUATES WITH DEGREES IN SCIENCE OR ENGINEERING, THERE WERE NO BACHELOR'S GRADUATES WITH DEGREES IN OTHER FIELDS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-39 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979, BACHELOR'S

FIELD	OCCUPATION TOTAL (DOLLARS)	OCCUPATION ENERGY-RELATED (DOLLARS)	OCCUPATION RATIO OF ENERGY-RELATED TO TOTAL	MAJOR TOTAL (DOLLARS)	MAJOR ENERGY-RELATED (DOLLARS)	MAJOR RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	19,700	19,800	1.01	20,000	20,000	1.00
CIVIL	16,800	18,000	1.07	17,200	19,200	1.12
ELECTRICAL OR ELECTRONIC	18,600	18,600	[illegible]0	18,800	18,800	1.00
MECHANICAL	18,500	19,000	[illegible]3	19,300	19,000	0.98
PETROLEUM, GEOLOGICAL, OR MINING	20,000	21,600	[illegible]08	20,400	21,500	1.05
NUCLEAR	17,800	17,300	0.97	18,200	18,700	1.03
METALLURGICAL AND MATERIALS	19,000	19,000	1.00	19,000	19,000	1.00
OTHER ENGINEERING	17,100	17,100	1.00	18,000	18,000	1.00
TOTAL, ENGINEERING	18,000	19,000	1.06	18,300	19,000	1.04
SCIENTISTS						
PHYSICAL	12,500	13,000	1.04	12,000	12,000	1.07
MATH AND COMPUTER	16,200	16,200	1.00	15,000	14,600	0.97
EARTH AND ENVIRONMENTAL	12,000	16,500	1.38	12,500	16,000	1.28
LIFE	10,500	11,600	1.10	11,000	15,000	1.36
SOCIAL	10,000	*	*	11,000	12,000	1.09
TOTAL, SCIENCE	12,000	14,700	1.22	11,600	14,700	1.27
OTHER	11,500	15,000	1.30	**	**	**
TOTAL	12,600	17,200	1.37	12,600	17,200	1.37

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* INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

** SINCE THE SAMPLE WAS SELECTED FROM GRADUATES WITH DEGREES IN SCIENCE OR ENGINEERING, THERE WERE NO BACHELOR'S GRADUATES WITH DEGREES IN OTHER FIELDS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-40 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980, BACHELOR'S

FIELD	OCCUPATION			MAJOR		
	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	22,200	22,300	1.00	22,200	22,400	1.01
CIVIL	18,500	20,600	1.11	19,000	21,000	1.11
ELECTRICAL OR ELECTRONIC	21,000	21,000	1.00	21,000	21,500	1.02
MECHANICAL	20,900	21,000	1.00	21,000	21,000	1.00
PETROLEUM, GEOLOGICAL, OR MINING	23,400	24,000	1.03	24,500	25,000	1.02
NUCLEAR	20,100	21,500	1.07	20,400	20,700	1.01
METALLURGICAL AND MATERIALS	21,900	20,000	0.91	20,000	16,500	0.82
OTHER ENGINEERING	20,000	20,400	1.02	20,000	20,500	1.02
TOTAL, ENGINEERING	20,400	21,000	1.03	20,500	21,500	1.05
SCIENTISTS						
PHYSICAL	14,000	17,700	1.26	14,200	17,300	1.22
MATH AND COMPUTER	18,000	18,400	1.02	17,000	17,800	1.05
EARTH AND ENVIRONMENTAL	13,900	17,400	1.25	13,000	18,500	1.42
LIFE	11,000	12,000	1.09	11,500	15,000	1.30
SOCIAL	10,900	15,100	1.39	12,000	17,000	1.42
TOTAL, SCIENCE	13,000	17,000	1.31	12,000	17,000	1.42
OTHER	12,000	18,000	1.50	**	**	**
TOTAL	14,000	20,000	1.43	14,000	20,000	1.43

** SINCE THE SAMPLE WAS SELECTED FROM GRADUATES WITH DEGREES IN SCIENCE OR ENGINEERING, THERE WERE NO BACHELOR'S GRADUATES WITH DEGREES IN OTHER FIELDS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-41 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1973 GRADUATES IN 1979, MASTER'S

FIELD	OCCUPATION TOTAL (DOLLARS)	OCCUPATION ENERGY-RELATED (DOLLARS)	OCCUPATION RATIO OF ENERGY-RELATED TO TOTAL	MAJOR TOTAL (DOLLARS)	MAJOR ENERGY-RELATED (DOLLARS)	MAJOR RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	25,000	25,500	1.02	25,000	25,000	1.00
CIVIL	24,000	25,000	1.04	25,000	25,000	1.00
ELECTRICAL OR ELECTRONIC	25,000	24,900	1.00	25,300	24,000	0.95
MECHANICAL	24,500	24,000	0.98	25,000	25,000	1.00
PETROLEUM, GEOLOGICAL, OR MINING	28,000	30,000	1.07	25,000	31,400	1.26
NUCLEAR	24,000	23,000	0.96	23,600	22,700	0.96
METALLURGICAL AND MATERIALS	26,000	33,000	1.27	25,500	33,000	1.29
OTHER ENGINEERING	24,000	25,600	1.07	25,000	28,000	1.12
TOTAL, ENGINEERING	25,000	25,000	1.00	25,000	25,000	1.00
SCIENTISTS						
PHYSICAL	16,000	20,000	1.25	18,500	15,200	0.82
MATH AND COMPUTER	21,600	18,500	0.86	20,000	19,500	0.97
EARTH AND ENVIRONMENTAL	20,000	21,000	1.05	20,000	21,000	1.05
LIFE	15,000	*	*	15,000	*	*
SOCIAL	15,300	*	*	15,000	30,000	2.00
TOTAL, SCIENCE	17,700	21,900	1.24	16,600	21,500	1.30
OTHER	16,000	21,500	1.34	16,500	21,500	1.30
TOTAL	18,000	24,300	1.35	18,000	24,300	1.35

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* INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-42 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1977 GRADUATES IN 1979, MASTER'S

FIELD	OCCUPATION			MAJOR		
	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	20,400	20,000	0.98	21,600	21,000	0.97
CIVIL	19,900	21,500	1.08	20,000	22,000	1.10
ELECTRICAL OR ELECTRONIC	21,500	21,000	0.98	22,000	21,000	0.95
MECHANICAL	21,000	20,700	0.99	21,300	21,300	1.00
PETROLEUM, GEOLOGICAL, OR MINING	22,000	22,200	1.01	23,000	23,000	1.00
NUCLEAR	20,000	20,400	1.02	20,000	21,300	1.06
METALLURGICAL AND MATERIALS	16,000	21,600	1.35	19,900	21,600	1.09
OTHER ENGINEERING	20,000	22,000	1.10	20,000	22,000	1.10
TOTAL, ENGINEERING	20,400	21,600	1.06	21,000	22,000	1.05
SCIENTISTS						
PHYSICAL	15,300	15,300	1.00	15,000	16,000	1.07
MATH AND COMPUTER	19,000	19,400	1.02	18,000	19,400	1.08
EARTH AND ENVIRONMENTAL	18,500	21,000	1.14	18,000	21,000	1.17
LIFE	12,200	15,000	1.23	12,500	17,500	1.40
SOCIAL	11,000	13,500	1.23	13,000	16,000	1.23
TOTAL, SCIENCE	14,000	19,400	1.39	14,000	19,200	1.37
OTHER	13,200	21,000	1.59	11,000	*	*
TOTAL	16,200	21,000	1.30	16,200	21,000	1.30

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* INDICATES TOO FEW RESPONDENTS FOR RELIABLE RESULTS.

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE E-43 . MEDIAN SALARY: TOTAL VERSUS ENERGY-RELATED 1978-79 GRADUATES IN 1980, MASTER'S

	OCCUPATION			MAJOR		
FIELD	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL	TOTAL (DOLLARS)	ENERGY-RELATED (DOLLARS)	RATIO OF ENERGY-RELATED TO TOTAL
ENGINEERS						
CHEMICAL	24,000	23,700	0.99	24,000	24,000	1.00
CIVIL	22,000	23,000	1.05	22,500	24,000	1.07
ELECTRICAL OR ELECTRONIC	24,000	24,000	1.00	24,000	23,600	0.98
MECHANICAL	24,600	24,500	1.00	24,000	24,600	1.02
PETROLEUM, GEOLOGICAL, OR MINING	25,000	27,500	1.10	25,000	27,500	1.10
NUCLEAR	23,300	23,500	1.01	23,000	23,400	1.02
METALLURGICAL AND MATERIALS	24,000	13,200	0.55	24,000	8,700	0.36
OTHER ENGINEERING	23,000	25,000	1.09	23,100	25,000	1.08
TOTAL, ENGINEERING	23,900	24,000	1.00	24,000	24,100	1.00
SCIENTISTS						
PHYSICAL	15,000	16,500	1.10	16,500	18,000	1.09
MATH AND COMPUTER	21,500	22,000	1.02	21,000	22,200	1.06
EARTH AND ENVIRONMENTAL	20,000	24,000	1.20	17,900	24,000	1.34
LIFE	13,000	13,800	1.06	13,100	18,000	1.37
SOCIAL	13,300	17,000	1.28	14,200	17,000	1.20
TOTAL, SCIENCE	15,000	22,000	1.47	15,000	22,000	1.47
OTHER	15,000	19,000	1.27	12,000	14,000	1.17
TOTAL	18,000	23,600	1.31	18,000	23,600	1.31

NOTE: ALL SALARY FIGURES HAVE BEEN ROUNDED TO THE NEAREST HUNDRED. SALARIES FOR RESPONDENTS ACADEMICALLY EMPLOYED FOR NINE TO TEN MONTHS HAVE BEEN ADJUSTED BY A FACTOR OF 11/9.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1979 AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

APPENDIX F. COMPARISON OF 1976, 1978, 1979, AND 1980 SURVEY

TABLE F-1. COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT ENERGY-RELATED VERSUS MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
MAJOR	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	33.4	35.3	34.3	32.0	42.5	23.2
CIVIL	19.8	16.9	18.6	15.3	18.4	16.6
ELECTRICAL OR ELECTRONIC	13.6	20.7	15.6	14.5	14.1	14.3
MECHANICAL	35.0	33.8	34.2	31.5	34.8	24.5
PETROLEUM, GEOLOGICAL, OR MINING	78.1	65.0	79.8	76.7	68.9	*
NUCLEAR	80.2	58.2	75.0	77.2	69.2	*
METALLURGICAL AND MATERIALS	31.9	36.4	12.3	34.0	37.8	*
OTHER ENGINEERING	13.1	15.1	11.1	10.5	14.3	15.5
TOTAL, ENGINEERING	22.7	22.8	21.5	19.3	22.1	17.5
SCIENTISTS						
PHYSICAL	11.0	11.2	12.2	10.9	11.5	4.3
MATH AND COMPUTER	4.8	8.4	3.6	5.0	7.5	+
EARTH AND ENVIRONMENTAL	27.4	14.8	27.5	18.4	24.5	16.8
LIFE	3.8	2.3	3.9	3.8	3.7	+
SOCIAL	3.1	3.9	3.5	1.8	3.1	+
TOTAL, SCIENCE	5.2	5.2	5.3	4.0	5.0	1.8
OTHER	6.0	3.0	3.1	4.2	3.4	0.4
TOTAL	9.5	8.3	8.8	6.9	8.3	4.6

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 1.3 PERCENT WERE ENERGY-RELATED.

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-2. COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT ENERGY-RELATED VERSUS OCCUPATION

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
OCCUPATION	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	35.4	34.7	29.8	31.9	36.0	29.0
CIVIL	18.9	13.0	15.2	10.1	17.6	17.1
ELECTRICAL OR ELECTRONIC	15.6	22.6	18.1	13.8	14.4	18.5
MECHANICAL	30.7	35.7	31.7	37.9	37.5	31.4
PETROLEUM, GEOLOGICAL, OR MINING	82.1	79.5	74.2	88.9	82.3	*
NUCLEAR	75.3	61.5	69.2	80.5	68.0	*
METALLURGICAL AND MATERIALS	23.2	49.2	9.7	63.7	46.0	*
OTHER ENGINEERING	13.1	17.1	11.4	15.2	14.5	18.8
TOTAL, ENGINEERING	23.7	24.8	22.1	23.0	24.5	21.0
SCIENTISTS						
PHYSICAL	13.4	11.4	12.3	15.4	18.0	6.5
MATH AND COMPUTER	5.5	8.8	3.9	5.9	6.4	+
EARTH AND ENVIRONMENTAL	39.4	29.5	45.6	33.2	34.0	26.6
LIFE	2.6	0.7	1.8	2.7	2.1	+
SOCIAL	3.5	2.3	3.8	2.5	4.3	+
TOTAL, SCIENCE	7.1	6.3	7.0	6.8	7.3	3.4
OTHER	3.2	3.6	3.3	2.0	2.6	1.4
TOTAL	9.6	8.3	8.8	6.9	8.3	4.6

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 2.0 PERCENT WERE ENERGY-RELATED.

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-3 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY SOURCE INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS AND ENGINEERS

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
MAJOR ENERGY SOURCE	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
COAL AND COAL PRODUCTS	16.9	20.1	23.2	17.9	16.2
PETROLEUM AND NATURAL GAS *	46.9	45.9	42.7	42.9	47.3
NUCLEAR (FISSION AND FUSION)	17.6	20.5	18.1	21.7	21.2
SOLAR	8.6	8.3	11.3	8.4	7.2
OTHER	10.0	5.1	4.7	9.1	8.1
TOTAL	100.0	100.0	100.0	100.0	100.0

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-4 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY SOURCE INVOLVED IN OCCUPATIONS OF ENERGY-RELATED ENGINEERS

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
MAJOR ENERGY SOURCE	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
COAL AND COAL PRODUCTS	17.4	19.8	26.3	20.3	16.7
PETROLEUM AND NATURAL GAS *	45.7	45.0	42.2	40.9	48.5
NUCLEAR (FISSION AND FUSION)	20.6	21.6	19.5	24.2	21.6
SOLAR	7.6	8.7	8.2	5.8	6.6
OTHER	8.6	4.8	3.8	8.8	6.6
TOTAL	100.0	100.0	100.0	100.0	100.0

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-5 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY SOURCE INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS

MAJOR ENERGY SOURCE	1980 SURVEY 1978-79 GRADUATES (PERCENT)	1979 SURVEY 1973 GRADUATES (PERCENT)	1979 SURVEY 1977 GRADUATES (PERCENT)	1978 SURVEY 1972 GRADUATES (PERCENT)	1978 SURVEY 1976 GRADUATES (PERCENT)
COAL AND COAL PRODUCTS	15.7	21.0	17.0	12.0	15.0
PETROLEUM AND NATURAL GAS *	49.7	48.5	43.7	47.6	44.5
NUCLEAR (FISSION AND FUSION)	10.5	17.2	15.1	15.7	20.2
SOLAR	10.8	7.2	17.7	14.8	8.7
OTHER	13.3	6.1	6.6	9.8	11.6
TOTAL	100.0	100.0	100.0	100.0	100.0

---

* INCLUDES OIL SHALE AND TAR SANDS.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-6 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS AND ENGINEERS *,**

ACTIVITY	1980 SURVEY	1979 SURVEY		1978 SURVEY	
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	18.2	11.9	17.6	16.6	17.9
EXTRACTION	15.9	11.6	17.8	15.4	14.3
MANUFACTURING	14.5	12.8	14.7	15.7	15.0
FUEL PROCESSING	11.9	10.8	11.9	10.4	11.4
ELECTRIC POWER GENERATION	24.1	27.6	23.0	25.7	20.5
TRANSPORTATION OF ENERGY	16.1	17.2	13.4	17.1	13.8
ENERGY STORAGE	5.3	5.7	5.2	6.7	5.1
ENERGY UTILIZATION, MANAGEMENT	14.1	23.2	18.4	19.8	17.1
FUEL REPROCESSING OR DISPOSAL	4.1	3.5	4.2	3.0	5.0
CONSERVATION	17.5	24.1	16.4	15.8	21.4
ENVIRONMENTAL IMPACT	14.7	12.8	14.1	13.5	13.2
EDUCATION, TRAINING	7.1	5.8	5.6	5.9	5.0
OTHER	6.8	5.7	5.1	9.8	9.5

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* THE QUESTION WAS NOT INCLUDED IN THE 1976 SURVEY.

** RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-7 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED ENGINEERS *,**

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	10.6	6.1	8.2	9.2	9.8
EXTRACTION	17.4	10.8	18.2	17.2	13.9
MANUFACTURING	16.9	15.3	17.5	19.9	18.4
FUEL PROCESSING	11.3	10.7	11.6	11.9	11.2
ELECTRIC POWER GENERATION	30.1	33.1	28.9	29.1	25.5
TRANSPORTATION OF ENERGY	17.6	18.8	16.6	19.7	16.6
ENERGY STORAGE	5.8	6.8	4.4	8.0	4.3
ENERGY UTILIZATION, MANAGEMENT	13.4	22.7	21.5	24.1	18.2
FUEL REPROCESSING OR DISPOSAL	2.9	2.8	3.6	3.4	5.9
CONSERVATION	20.0	28.1	20.7	18.9	22.8
ENVIRONMENTAL IMPACT	10.2	11.1	12.7	14.0	12.6
EDUCATION, TRAINING	5.0	5.1	6.2	3.8	3.7
OTHER	6.4	4.4	2.6	4.6	5.1

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* THE QUESTION WAS NOT INCLUDED IN THE 1976 SURVEY.

** RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-8 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: ALL ENERGY-RELATED ACTIVITIES INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS *,**

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	33.7	29.0	36.1	34.2	34.5
EXTRACTION	12.9	14.1	17.0	11.3	15.2
MANUFACTURING	9.4	5.4	9.2	5.5	8.1
FUEL PROCESSING	13.0	11.2	12.4	6.8	11.7
ELECTRIC POWER GENERATION	11.7	11.2	11.5	17.7	10.2
TRANSPORTATION OF ENERGY	13.1	12.5	7.0	11.1	7.9
ENERGY STORAGE	4.2	2.5	6.9	3.5	6.7
ENERGY UTILIZATION, MANAGEMENT	15.5	24.5	12.3	9.5	15.0
FUEL REPROCESSING OR DISPOSAL	6.5	5.7	5.4	2.2	2.9
CONSERVATION	12.3	12.1	8.0	8.4	18.5
ENVIRONMENTAL IMPACT	24.0	17.6	16.8	12.4	14.2
EDUCATION, TRAINING	11.3	8.1	4.5	11.1	7.7
OTHER	7.6	9.5	9.8	22.2	18.5

---

* THE QUESTION WAS NOT INCLUDED IN THE 1976 SURVEY.

** RESPONDENTS WERE ASKED TO CHECK ANY CATEGORY IN WHICH THEY WERE INVOLVED. MANY CHECKED MORE THAN ONE CATEGORY.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-9 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY-RELATED ACTIVITY INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS AND ENGINEERS

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
ENERGY-RELATED ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	14.7	8.3	13.1	12.4	13.7
EXTRACTION	9.9	6.7	11.6	9.7	8.6
MANUFACTURE AND PROCESSING	18.8	15.2	19.6	18.7	18.1
ELECTRIC POWER GENERATION	15.9	20.8	16.5	15.0	13.4
TRANSPORTATION AND STORAGE	9.5	11.7	8.8	10.5	9.2
ENERGY UTILIZATION, MANAGEMENT	7.7	11.7	8.2	8.9	6.9
CONSERVATION	9.3	12.4	7.3	8.3	12.0
ENVIRONMENTAL IMPACT	3.8	5.1	6.5	4.5	6.8
OTHER	10.4	8.0	8.3	12.1	11.4
TOTAL	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-10 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY-RELATED ACTIVITY INVOLVED IN OCCUPATIONS OF ENERGY-RELATED ENGINEERS

ENERGY-RELATED ACTIVITY	1980 SURVEY	1979 SURVEY		1978 SURVEY	
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	8.3	3.3	4.6	3.7	6.2
EXTRACTION	11.8	7.5	13.8	12.0	10.2
MANUFACTURE AND PROCESSING	22.9	16.3	22.7	22.9	21.6
ELECTRIC POWER GENERATION	20.3	25.9	21.1	17.1	17.9
TRANSPORTATION AND STORAGE	10.7	13.5	11.7	12.6	10.7
ENERGY UTILIZATION, MANAGEMENT	5.6	11.1	8.1	11.6	8.3
CONSERVATION	10.7	14.5	8.8	10.2	12.2
ENVIRONMENTAL IMPACT	1.6	2.9	4.2	3.3	5.7
OTHER	8.1	5.0	5.1	6.5	7.1
TOTAL	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-11 . COMPARISON OF 1980, 1979, AND 1978 SURVEY: MAJOR ENERGY-RELATED ACTIVITY INVOLVED IN OCCUPATIONS OF ENERGY-RELATED SCIENTISTS

	1980 SURVEY	1979 SURVEY		1978 SURVEY	
ENERGY-RELATED ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)
EXPLORATION	29.8	23.0	29.9	32.8	29.2
EXTRACTION	5.7	4.4	7.3	4.2	5.2
MANUFACTURE AND PROCESSING	9.3	12.1	13.3	8.7	10.9
ELECTRIC POWER GENERATION	5.6	5.7	7.4	10.0	4.1
TRANSPORTATION AND STORAGE	6.8	6.5	3.1	5.6	6.0
ENERGY UTILIZATION, MANAGEMENT	12.5	13.6	8.6	2.4	4.0
CONSERVATION	5.9	6.3	4.5	3.9	11.6
ENVIRONMENTAL IMPACT	8.8	11.5	11.2	7.2	9.0
OTHER	15.7	16.8	14.8	25.1	20.1
TOTAL	100.0	100.0	100.0	100.0	100.0

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-12. COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	PERCENT WITH OCCUPATION SAME AS COLLEGE MAJOR					
	SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY						
1974-75 GRADUATES	48.9	79.9	81.1	91.1	40.0	55.5
1978 SURVEY						
1972 GRADUATES	42.4	75.3	76.2	89.6	32.7	55.2
1976 GRADUATES	46.7	73.4	82.8	91.6	37.6	53.1
1979 SURVEY						
1973 GRADUATES	48.4	73.1	79.4	91.4	38.3	47.0
1977 GRADUATES	52.3	76.3	87.5	95.0	42.2	54.4
1980 SURVEY						
1978-79 GRADUATES	55.2	79.1	87.8	93.6	44.4	58.4

NOTE: IN THIS TABLE THE SCIENCE AND ENGINEERING FIELDS ARE NOT SUBDIVIDED INTO SPECIALTY AREAS. ALL GRADUATES ARE INCLUDED IF THEIR OCCUPATION IS IN THE SAME MAJOR FIELD (EITHER SCIENCE OR ENGINEERING) IN WHICH THEY HOLD THEIR HIGHEST DEGREE.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-13 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, AND 1978 SURVEY: MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION, RECENT BACHELOR'S GRADUATES*

PERCENT OF BACHELOR'S WITH OCCUPATION SAME AS COLLEGE MAJOR

	SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1978 SURVEY						
1972 GRADUATES	30.5	69.8	74.0	90.0	19.6	39.9
1976 GRADUATES	38.9	67.2	82.4	90.4	30.1	44.0
1979 SURVEY						
1973 GRADUATES	37.3	64.8	77.3	90.4	25.8	30.4
1977 GRADUATES	46.6	72.3	87.7	95.0	36.6	47.2
1980 SURVEY						
1978-79 GRADUATES	49.5	75.4	87.6	93.5	38.2	51.3

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* NOT TABULATED FOR 1976.

NOTE: IN THIS TABLE THE SCIENCE AND ENGINEERING FIELDS ARE NOT SUBDIVIDED INTO SPECIALTY AREAS. ALL GRADUATES ARE INCLUDED IF THEIR OCCUPATION IS IN THE SAME MAJOR FIELD (EITHER SCIENCE OR ENGINEERING) IN WHICH THEY HOLD THEIR HIGHEST DEGREE.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-14 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, AND 1978 SURVEY: MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD AND OCCUPATION, RECENT MASTER'S GRADUATES*

PERCENT OF MASTER'S WITH OCCUPATION SAME AS COLLEGE MAJOR

	SCIENTISTS AND ENGINEERS		ENGINEERS		SCIENTISTS	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1978 SURVEY						
1972 GRADUATES	63.0	81.3	78.8	89.0	55.7	70.0
1976 GRADUATES	72.8	87.2	83.4	94.0	67.9	77.5
1979 SURVEY						
1973 GRADUATES	66.8	86.1	82.4	92.9	59.2	74.4
1977 GRADUATES	72.4	86.5	87.7	94.7	64.9	75.2
1980 SURVEY						
1978-79 GRADUATES	79.4	91.3	88.6	93.6	74.9	87.0

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* NOT TABULATED FOR 1976.

NOTE: IN THIS TABLE THE SCIENCE AND ENGINEERING FIELDS ARE NOT SUBDIVIDED INTO SPECIALTY AREAS. ALL GRADUATES ARE INCLUDED IF THEIR OCCUPATION IS IN THE SAME MAJOR FIELD (EITHER SCIENCE OR ENGINEERING) IN WHICH THEY HOLD THEIR HIGHEST DEGREE.

SOURCE: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES.

TABLE F-15. COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT NONWHITE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	SCIENCE AND ENGINEERING MAJOR		SCIENCE AND ENGINEERING OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	6.5	2.4	6.0	2.2
1978 SURVEY				
1972 GRADUATES	5.2	6.6	5.6	7.0
1976 GRADUATES	6.7	5.0	7.2	4.5
1979 SURVEY				
1973 GRADUATES	6.0	3.5	5.6	4.0
1977 GRADUATES	6.2	5.4	5.5	4.8
1980 SURVEY				
1978-79 GRADUATES	6.3	7.3	6.2	7.7

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER, 1978), ORAU-147.

TABLE F-16. COMPARISON OF ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT NONWHITE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	ENGINEERING MAJOR		ENGINEERING OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	6.8	3.1	6.5	2.3
1978 SURVEY				
1972 GRADUATES	5.5	7.7	5.3	8.2
1976 GRADUATES	7.7	4.5	7.3	4.2
1979 SURVEY				
1973 GRADUATES	5.2	3.4	4.8	4.2
1977 GRADUATES	5.4	5.9	5.4	5.3
1980 SURVEY				
1978-79 GRADUATES	7.0	8.6	7.1	9.4

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-17. COMPARISON OF SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT NONWHITE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	SCIENCE MAJOR		SCIENCE OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	6.4	1.0	5.6	1.7
1978 SURVEY				
1972 GRADUATES	5.1	5.1	5.7	4.0
1976 GRADUATES	6.4	5.5	7.2	3.1
1979 SURVEY				
1973 GRADUATES	6.2	3.6	6.2	3.4
1977 GRADUATES	6.4	4.8	5.5	3.7
1980 SURVEY				
1978-79 GRADUATES	6.1	5.6	5.6	3.8

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-18. COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT FEMALE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	SCIENCE AND ENGINEERING MAJOR		SCIENCE AND ENGINEERING OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	29.1	8.3	19.3	6.7
1978 SURVEY				
1972 GRADUATES	21.6	6.0	14.5	5.8
1976 GRADUATES	29.2	13.5	22.2	9.6
1979 SURVEY				
1973 GRADUATES	22.0	7.9	14.3	7.1
1977 GRADUATES	30.0	13.6	22.9	11.3
1980 SURVEY				
1978-79 GRADUATES	31.7	13.7	24.0	13.4

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-19. COMPARISON OF ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT FEMALE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	ENGINEERING MAJOR		ENGINEERING OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	2.5	3.1	3.4	3.7
1978 SURVEY				
1972 GRADUATES	1.0	0.8	2.7	2.1
1976 GRADUATES	3.7	4.3	6.2	5.5
1979 SURVEY				
1973 GRADUATES	1.0	1.2	2.5	3.5
1977 GRADUATES	4.7	4.3	7.3	5.1
1980 SURVEY				
1978-79 GRADUATES	7.0	6.4	8.7	7.5

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-20. COMPARISON OF SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: PERCENT FEMALE, TOTAL VERSUS ENERGY-RELATED RECENT GRADUATES

	SCIENCE MAJOR		SCIENCE OCCUPATION	
	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)	TOTAL (PERCENT)	ENERGY-RELATED (PERCENT)
1976 SURVEY				
1974-75 GRADUATES	35.0	19.5	29.1	18.3
1978 SURVEY				
1972 GRADUATES	27.6	13.3	23.4	15.1
1976 GRADUATES	35.6	23.7	32.4	18.3
1979 SURVEY				
1973 GRADUATES	28.9	17.4	22.9	17.5
1977 GRADUATES	37.3	24.5	33.3	24.5
1980 SURVEY				
1978-79 GRADUATES	39.8	24.0	34.7	27.0

SOURCES: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1980, 1979, AND 1978 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-21 . COMPARISON OF ALL SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

TYPE OF EMPLOYER	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	57.7	57.6	53.9	53.8	52.4	46.1
EDUCATIONAL INSTITUTION	20.1	15.4	20.7	18.9	19.1	20.4
FEDERAL GOVERNMENT	7.4	9.3	7.9	10.3	8.0	10.6
STATE OR LOCAL GOVERNMENT	6.3	9.6	8.4	8.8	9.0	11.1
NONPROFIT ORGANIZATION	3.0	2.5	2.8	2.6	3.9	10.0
OTHER	5.5	5.6	6.3	5.6	7.6	1.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SCIENTISTS AND ENGINEERS DEFINED BY OCCUPATION. TABLE DOES NOT INCLUDE GRADUATES WHOSE OCCUPATION IS IN A FIELD OTHER THAN SCIENCE OR ENGINEERING.
SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-22 . COMPARISON OF ENERGY-RELATED SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
TYPE OF EMPLOYER	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	79.5	84.4	77.2	83.1	77.0	78.1
EDUCATIONAL INSTITUTION	10.5	6.3	9.2	5.3	12.9	10.3
FEDERAL GOVERNMENT	5.7	6.4	6.9	6.0	5.8	5.7
STATE OR LOCAL GOVERNMENT	1.9	2.4	2.3	2.1	1.8	2.1
NONPROFIT ORGANIZATION	1.6	0.3	2.0	2.8	2.0	2.2
OTHER	0.9	0.2	2.4	0.8	0.7	1.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SCIENTISTS AND ENGINEERS DEFINED BY OCCUPATION. TABLE DOES NOT INCLUDE GRADUATES WHOSE OCCUPATION IS IN A FIELD OTHER THAN SCIENCE OR ENGINEERING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-23 . COMPARISON OF ALL ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

TYPE OF EMPLOYER	1980 SURVEY 1978-79 GRADUATES (PERCENT)	1979 SURVEY 1973 GRADUATES (PERCENT)	1979 SURVEY 1977 GRADUATES (PERCENT)	1978 SURVEY 1972 GRADUATES (PERCENT)	1978 SURVEY 1976 GRADUATES (PERCENT)	1976 SURVEY 1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	80.6	78.7	77.6	76.6	78.5	73.2
EDUCATIONAL INSTITUTION	7.0	3.3	7.5	2.7	5.5	7.0
FEDERAL GOVERNMENT	5.3	8.0	6.7	9.6	7.8	12.3
STATE OR LOCAL GOVERNMENT	3.5	6.2	4.3	6.3	4.4	5.3
NONPROFIT ORGANIZATION	0.8	1.0	0.8	1.7	0.7	1.3
OTHER	2.8	2.8	3.2	3.1	3.0	0.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
ENGINEERS DEFINED BY OCCUPATION.
SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-24 . COMPARISON OF ENERGY-RELATED ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
TYPE OF EMPLOYER	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	84.5	91.1	85.3	87.9	85.0	81.4
EDUCATIONAL INSTITUTION	8.2	3.3	5.8	1.4	7.9	7.4
FEDERAL GOVERNMENT	3.7	3.6	4.4	5.0	5.2	5.6
STATE OR LOCAL GOVERNMENT	1.0	1.6	1.2	1.6	0.3	2.1
NONPROFIT ORGANIZATION	1.6	0.1	0.8	3.1	1.2	1.5
OTHER	1.1	0.3	2.5	1.1	0.5	2.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

ENGINEERS DEFINED BY OCCUPATION.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-25 . COMPARISON OF ALL SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

TYPE OF EMPLOYER	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	41.6	42.1	38.1	36.8	35.8	29.2
EDUCATIONAL INSTITUTION	29.2	24.3	29.6	31.0	27.7	28.8
FEDERAL GOVERNMENT	8.8	10.3	8.7	10.7	8.1	9.5
STATE OR LOCAL GOVERNMENT	8.3	12.1	11.1	10.7	11.9	14.8
NONPROFIT ORGANIZATION	4.6	3.6	4.1	3.4	6.0	15.4
OTHER	7.5	7.6	8.4	7.4	10.4	2.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SCIENTISTS DEFINED BY OCCUPATION.
SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-26 . COMPARISON OF ENERGY-RELATED SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: TYPE OF EMPLOYER

TYPE OF EMPLOYER	1980 SURVEY 1978-79 GRADUATES (PERCENT)	1979 SURVEY 1973 GRADUATES (PERCENT)	1979 SURVEY 1977 GRADUATES (PERCENT)	1978 SURVEY 1972 GRADUATES (PERCENT)	1978 SURVEY 1976 GRADUATES (PERCENT)	1976 SURVEY 1974-75 GRADUATES (PERCENT)
BUSINESS OR INDUSTRY	67.7	65.6	60.0	71.0	60.1	65.6
EDUCATIONAL INSTITUTION	15.9	14.7	16.5	15.1	23.2	21.4
FEDERAL GOVERNMENT	10.5	14.3	12.3	8.6	7.1	6.5
STATE OR LOCAL GOVERNMENT	4.0	4.5	4.5	3.4	4.8	1.9
NONPROFIT ORGANIZATION	1.6	0.9	4.6	2.0	3.7	4.7
OTHER	0.4	0.0	2.0	0.0	1.1	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

NOTES: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.
SCIENTISTS DEFINED BY OCCUPATION.
SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-27 . COMPARISON OF ALL SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

ACTIVITY	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
MANAGEMENT	8.5	17.2	9.7	17.1	11.2	12.5
TEACHING	10.2	8.8	10.0	8.2	6.7	6.8
BASIC RESEARCH	10.0	7.1	10.2	7.7	9.5	11.1
APPLIED RESEARCH	7.3	6.8	7.2	6.7	7.6	9.1
DEVELOPMENT	10.4	10.1	11.2	8.8	8.0	10.8
REPORT, TECHNICAL WRITING	5.5	5.8	6.0	5.8	8.2	2.0
DESIGN	10.4	7.2	7.3	7.2	8.1	9.8
QUALITY CONTROL	6.7	4.5	7.4	4.9	7.3	6.1
OPERATIONS	9.5	10.3	10.3	9.0	10.0	6.3
DISTRIBUTION	2.2	2.2	2.5	2.0	2.1	2.0
CONSULTING	2.7	4.1	2.6	3.9	2.6	3.9
COMPUTER APPLICATIONS	10.9	9.6	9.9	10.1	9.4	+
OTHER	5.7	6.3	5.6	8.7	9.4	19.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-28 . COMPARISON OF ENERGY-RELATED SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
MANAGEMENT	11.0	15.2	9.4	17.7	11.9	8.8
TEACHING	2.1	3.5	3.8	2.2	1.5	1.1
BASIC RESEARCH	7.4	5.4	6.4	5.1	7.3	6.6
APPLIED RESEARCH	10.8	9.2	9.2	9.0	10.7	14.1
DEVELOPMENT	11.8	10.6	11.3	8.1	8.0	10.9
REPORT, TECHNICAL WRITING	6.0	5.4	7.0	6.0	6.4	1.6
DESIGN	15.4	14.1	11.7	12.6	13.8	19.8
QUALITY CONTROL	6.4	2.8	7.2	5.3	6.8	6.8
OPERATIONS	15.0	15.8	17.8	11.5	14.4	12.1
DISTRIBUTION	2.3	*	4.0	1.7	2.1	1.9
CONSULTING	3.3	5.4	3.6	6.1	3.6	5.8
COMPUTER APPLICATIONS	5.9	7.6	5.7	7.8	7.2	+
OTHER	2.6	4.9	2.9	6.9	6.3	10.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-29 . COMPARISON OF ALL ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

ACTIVITY	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
MANAGEMENT	9.8	19.6	9.9	22.0	12.4	13.9
TEACHING	2.3	2.9	3.6	1.6	1.0	2.1
BASIC RESEARCH	3.4	2.0	4.0	1.0	1.9	3.8
APPLIED RESEARCH	5.6	5.6	4.7	4.0	4.8	8.1
DEVELOPMENT	17.1	16.0	17.4	14.3	13.8	14.5
REPORT, TECHNICAL WRITING	5.9	5.9	5.5	6.0	8.3	1.3
DESIGN	23.1	15.7	17.1	15.4	18.1	22.7
QUALITY CONTROL	7.8	5.1	9.6	6.2	9.9	7.4
OPERATIONS	13.8	15.7	16.2	16.1	17.2	9.7
DISTRIBUTION	1.7	3.2	2.9	1.7	1.1	2.8
CONSULTING	3.1	4.8	2.9	4.5	3.8	4.2
COMPUTER APPLICATIONS	4.1	2.1	4.4	3.7	4.1	+
OTHER	2.4	1.5	1.8	3.5	3.6	9.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-30 . COMPARISON OF ENERGY-RELATED ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
ACTIVITY	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
MANAGEMENT	11.1	16.4	9.8	21.3	14.5	9.2
TEACHING	1.3	3.9	*	1.7	0.7	0.4
BASIC RESEARCH	5.5	*	4.0	1.5	2.5	4.9
APPLIED RESEARCH	7.5	7.7	6.0	6.8	5.4	11.6
DEVELOPMENT	12.2	12.7	12.2	9.4	9.1	10.3
REPORT, TECHNICAL WRITING	6.4	4.5	4.1	5.6	7.0	0.8
DESIGN	21.2	17.3	16.3	17.1	19.3	24.6
QUALITY CONTROL	5.7	3.3	7.6	5.1	7.6	6.2
OPERATIONS	19.1	19.5	23.4	15.1	20.4	13.9
DISTRIBUTION	2.2	*	5.4	2.4	2.2	2.0
CONSULTING	3.4	5.1	4.0	5.7	4.8	6.2
COMPUTER APPLICATIONS	2.4	2.5	3.3	2.7	3.6	+
OTHER	1.9	7.1	3.8	5.7	2.9	10.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-31 . COMPARISON OF ALL SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

ACTIVITY	1980 SURVEY 1978-79 GRADUATES (PERCENT)	1979 SURVEY 1973 GRADUATES (PERCENT)	1979 SURVEY 1977 GRADUATES (PERCENT)	1978 SURVEY 1972 GRADUATES (PERCENT)	1978 SURVEY 1976 GRADUATES (PERCENT)	1976 SURVEY 1974-75 GRADUATES (PERCENT)
MANAGEMENT	7.6	15.4	9.5	13.4	10.4	11.5
TEACHING	15.7	13.2	14.3	13.2	10.4	9.8
BASIC RESEARCH	14.7	10.8	14.4	12.7	14.4	15.7
APPLIED RESEARCH	8.5	7.6	8.9	8.7	9.4	9.7
DEVELOPMENT	5.6	5.8	7.0	4.7	4.3	8.5
REPORT, TECHNICAL WRITING	5.2	5.7	6.3	5.6	8.1	2.4
DESIGN	1.5	1.0	0.8	1.0	1.7	1.8
QUALITY CONTROL	6.0	4.1	6.0	3.9	5.6	5.4
OPERATIONS	6.6	6.4	6.4	3.6	5.3	4.1
DISTRIBUTION	2.5	1.4	2.2	2.2	2.7	1.6
CONSULTING	2.5	3.5	2.4	3.6	1.9	3.6
COMPUTER APPLICATIONS	15.7	15.0	13.6	14.9	12.7	+
OTHER	8.0	9.9	8.2	12.5	13.2	25.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979,AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-32 . COMPARISON OF ENERGY-RELATED SCIENTISTS IN 1980, 1979, 1978, AND 1976 SURVEY: PRIMARY WORK ACTIVITY

ACTIVITY	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
MANAGEMENT	10.8	11.9	8.6	8.5	6.2	7.4
TEACHING	3.9	*	7.7	3.3	3.3	4.1
BASIC RESEARCH	11.9	14.7	11.6	14.5	17.3	13.6
APPLIED RESEARCH	18.6	13.7	16.1	14.7	21.9	23.4
DEVELOPMENT	10.7	*	9.2	5.0	5.7	13.2
REPORT, TECHNICAL WRITING	5.2	7.8	13.4	7.1	5.1	4.6
DESIGN	1.9	*	*	1.1	2.1	0.8
QUALITY CONTROL	8.2	*	*	6.0	5.1	9.0
OPERATIONS	5.4	*	5.9	2.4	1.5	5.2
DISTRIBUTION	2.5	0.0	*	0.0	1.9	1.5
CONSULTING	3.0	*	*	7.1	1.1	4.6
COMPUTER APPLICATIONS	14.0	22.2	10.8	20.5	15.0	+
OTHER	4.0	29.7	16.7	9.7	13.7	12.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

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* INCLUDED IN "OTHER" DUE TO SMALL SAMPLE SIZE.

+ NOT TABULATED IN 1976.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: A STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-33 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980,1979, 1978, AND 1976 SURVEY: EDUCATIONAL ATTAINMENT BY MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD, ALL RECENT GRADUATES

PERCENT WITH MASTER'S OR DOCTORAL DEGREE

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
MAJOR	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	21.5	40.3	27.8	34.1	35.3	25.8
CIVIL	23.7	30.8	30.2	35.9	29.4	33.4
ELECTRICAL OR ELECTRONIC	25.7	36.7	32.9	40.6	36.7	29.7
MECHANICAL	18.4	29.9	26.2	35.4	29.9	20.5
PETROLEUM, GEOLOGICAL, OR MINING	20.9	41.2	24.4	24.4	34.8	*
NUCLEAR	54.1	79.3	48.5	71.6	67.6	*
METALLURGICAL AND MATERIALS	56.2	74.1	46.2	90.8	67.1	*
OTHER ENGINEERING	27.2	46.1	34.4	40.9	35.9	37.4
TOTAL, ENGINEERING	24.9	39.0	31.7	39.4	34.7	31.1
SCIENTISTS						
PHYSICAL	22.6	51.7	26.9	48.7	28.1	25.6
MATH AND COMPUTER	27.4	38.1	27.4	40.0	30.7	+
EARTH AND ENVIRONMENTAL	25.7	36.3	24.0	41.6	27.8	30.0
LIFE	16.1	31.1	15.9	30.0	15.7	+
SOCIAL	13.5	25.8	17.1	24.1	17.3	+
TOTAL, SCIENCE	17.0	31.2	18.9	29.7	19.2	17.8
OTHER	100.0	100.0	100.0	100.0	100.0	100.0
ALL MAJORS	20.0	45.9	23.2	41.9	25.0	21.8

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 17.0 PERCENT HELD MASTER'S OR DOCTORAL DEGREES.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-34 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980,1979, 1978, AND 1976 SURVEY: EDUCATIONAL ATTAINMENT BY MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD, ALL RECENT GRADUATES

PERCENT WITH MASTER'S OR DOCTORAL DEGREE

MAJOR	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	29.6	39.8	20.5	39.8	40.2	37.4
CIVIL	25.6	47.3	30.3	53.8	33.8	40.1
ELECTRICAL OR ELECTRONIC	24.7	31.4	25.1	30.3	30.5	30.5
MECHANICAL	19.9	30.1	29.8	39.7	24.2	21.3
PETROLEUM, GEOLOGICAL, OR MINING	17.8	37.1	23.8	29.2	40.7	*
NUCLEAR	53.8	69.3	46.9	79.2	72.5	*
METALLURGICAL AND MATERIALS	42.2	82.2	61.6	92.9	84.1	*
OTHER ENGINEERING	28.0	41.5	32.1	36.0	29.0	41.3
TOTAL, ENGINEERING	25.7	38.2	29.1	41.1	33.8	33.8
SCIENTISTS						
PHYSICAL	22.1	61.8	41.3	76.4	42.9	37.4
MATH AND COMPUTER	20.2	37.9	37.3	53.3	22.1	+
EARTH AND ENVIRONMENTAL	37.5	64.5	30.2	59.6	43.1	47.9
LIFE	11.9	9.4	20.1	28.4	16.6	+
SOCIAL	9.2	17.0	13.6	12.2	19.5	+
TOTAL, SCIENCE	20.1	34.4	24.8	43.6	26.7	34.0
OTHER	100.0	100.0	100.0	100.0	100.0	100.0
ALL MAJORS	24.0	41.0	27.6	47.3	31.4	34.0

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 29.5 PERCENT HELD MASTER'S OR DOCTORAL DEGREES.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979,AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-35 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: EDUCATIONAL ATTAINMENT BY OCCUPATION, ALL RECENT GRADUATES

PERCENT WITH MASTER'S OR DOCTORAL DEGREE

OCCUPATION	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	21.9	43.4	25.0	45.4	32.2	28.5
CIVIL	24.0	34.1	31.5	34.8	30.9	35.8
ELECTRICAL OR ELECTRONIC	28.1	41.5	33.2	45.7	36.2	33.7
MECHANICAL	20.5	37.8	22.3	41.5	29.3	19.7
PETROLEUM, GEOLOGICAL, OR MINING	16.8	32.2	21.3	36.9	24.8	*
NUCLEAR	34.3	58.7	33.6	48.9	39.4	*
METALLURGICAL AND MATERIALS	42.3	65.5	35.5	47.7	34.5	*
OTHER ENGINEERING	24.8	45.6	32.9	40.2	33.2	32.6
TOTAL, ENGINEERING	24.6	41.6	29.9	41.5	32.6	31.2
SCIENTISTS						
PHYSICAL	24.1	61.7	26.5	64.5	32.0	26.3
MATH AND COMPUTER	26.4	46.3	29.0	46.6	37.6	+
EARTH AND ENVIRONMENTAL	35.5	69.3	33.7	66.0	39.6	38.5
LIFE	24.7	42.9	22.5	49.7	26.6	+
SOCIAL	41.7	73.5	44.6	75.7	49.1	+
TOTAL, SCIENCE	29.5	55.8	30.6	59.6	37.0	31.8
OTHER	9.4	42.8	14.0	34.7	14.8	11.4
ALL OCCUPATIONS	20.1	45.9	23.2	41.9	25.1	22.0

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 32.1 PERCENT HELD MASTER'S OR DOCTORAL DEGREES.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.

TABLE F-36 . COMPARISON OF SCIENTISTS AND ENGINEERS IN 1980, 1979, 1978, AND 1976 SURVEY: EDUCATIONAL ATTAINMENT BY OCCUPATION, ENERGY-RELATED RECENT GRADUATES

PERCENT WITH MASTER'S OR DOCTORAL DEGREE

	1980 SURVEY	1979 SURVEY		1978 SURVEY		1976 SURVEY
OCCUPATION	1978-79 GRADUATES (PERCENT)	1973 GRADUATES (PERCENT)	1977 GRADUATES (PERCENT)	1972 GRADUATES (PERCENT)	1976 GRADUATES (PERCENT)	1974-75 GRADUATES (PERCENT)
ENGINEERS						
CHEMICAL	28.1	59.6	25.4	51.7	40.1	40.9
CIVIL	24.1	51.3	34.1	57.4	37.2	39.5
ELECTRICAL OR ELECTRONIC	30.8	37.8	21.7	36.1	36.5	36.7
MECHANICAL	22.7	39.7	27.9	53.0	20.8	18.2
PETROLEUM, GEOLOGICAL, OR MINING	15.6	30.0	24.1	36.0	28.8	*
NUCLEAR	35.4	53.9	44.4	52.4	48.3	*
METALLURGICAL AND MATERIALS	44.9	55.6	83.2	37.0	32.7	*
OTHER ENGINEERING	23.5	34.5	36.1	35.1	33.9	38.5
TOTAL, ENGINEERING	24.7	40.5	29.4	43.5	31.8	34.4
SCIENTISTS						
PHYSICAL	21.2	80.2	38.5	77.3	36.5	37.3
MATH AND COMPUTER	27.9	36.1	34.3	40.2	29.6	+
EARTH AND ENVIRONMENTAL	41.6	74.2	29.5	62.6	48.2	54.5
LIFE	29.2	32.0	49.2	80.8	44.2	+
SOCIAL	26.4	60.9	33.6	37.2	50.7	+
TOTAL, SCIENCE	31.1	57.3	34.3	59.6	41.5	40.2
OTHER	8.0	28.8	10.8	46.3	12.4	19.9
ALL OCCUPATIONS	24.0	41.0	27.6	47.8	31.4	33.8

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* INCLUDED IN "OTHER" FOR 1976.

+ NOT TABULATED SEPARATELY FOR 1976. OF ALL GRADUATES IN THESE FIELDS, 33.2 PERCENT HELD MASTER'S OR DOCTORAL DEGREES.

NOTE: FIGURES MAY NOT ADD TO TOTALS DUE TO INDEPENDENT ROUNDING.

SOURCE: 1978, 1979, AND 1980 SURVEY: NATIONAL SCIENCE FOUNDATION AND U.S. DEPARTMENT OF ENERGY, 1978, 1979, AND 1980 SURVEY OF SCIENCE AND ENGINEERING GRADUATES; 1976 SURVEY: JANE E. RALL, ENERGY-RELATED SCIENTISTS AND ENGINEERS: STATISTICAL PROFILE OF NEW ENTRANTS INTO THE WORK FORCE, 1976 (OAK RIDGE, TENNESSEE: OAK RIDGE ASSOCIATED UNIVERSITIES, OCTOBER 1978), ORAU-147.